

CURTISS

FLYING BOATS : AERONAUTICAL MOTORS
AEROPLANES : HYDROAEROPLANES

THE CURTISS AEROPLANE CO. HAS
ALWAYS BEEN THE DOMINATING
CENTER OF AVIATION IN AMERICA.
ITS CAPACITY HAS STEADILY GROWN
UNTIL TO-DAY IT IS THE LARGEST
AND BEST EQUIPPED AEROPLANE
MANUFACTURING CORPORATION IN
THE WORLD, AMPLY EQUIPPED WITH
ALL FACILITIES FOR BUILDING A
LARGE VARIETY OF TYPES OF AERO-
PLANES, HYDROAEROPLANES, FLYING
BOATS AND AERONAUTICAL MOTORS
IN *LARGE QUANTITIES* AND FOR
PROMPT DELIVERY



Original Printing: in 1917 by the
Matthews-Northrup Company
of Buffalo New York USA

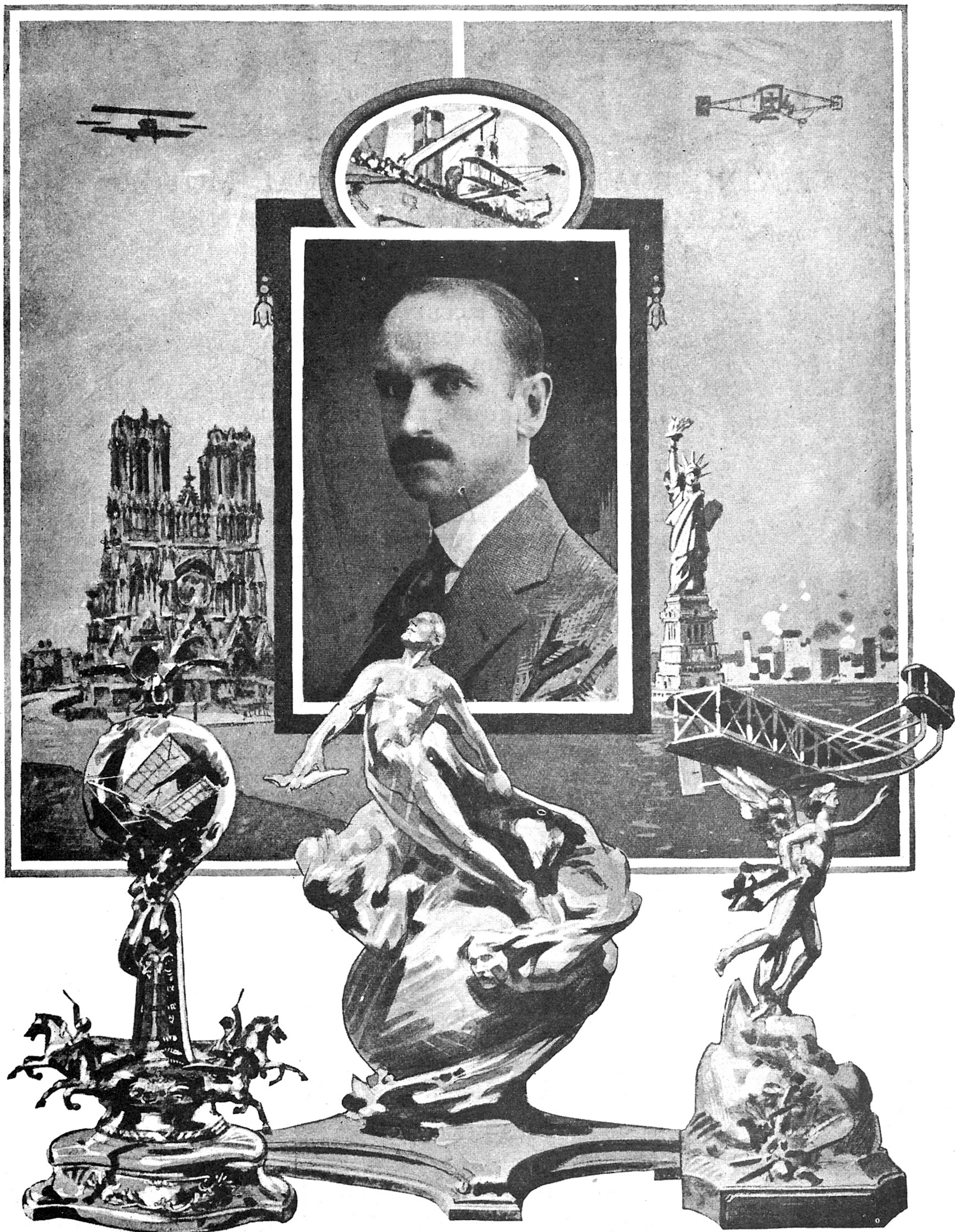
Edited by: Brian D. Szafranski
of Elma New York USA
Posted on: August 25, 2019

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THE CURTISS AEROPLANE CO.
BUFFALO, U. S. A.

CABLE ADDRESS: "CURTISAERO" WESTERN UNION CODE

IN ADDITION TO THE MAIN PLANT AND EXECUTIVE OFFICES IN BUFFALO, N. Y.,
THERE ARE FOUR OTHER BRANCH FACTORIES—THREE IN BUFFALO, N. Y., AND ONE
IN HAMMONDSPORT, N. Y., AS WELL AS TRAINING SCHOOLS, HANGARS AND FLYING
FIELDS AT BUFFALO, HAMMONDSPORT, N. Y., NEWPORT NEWS, VA., MIAMI, FLA.,
AND SAN DIEGO, CAL.



GLENN H. CURTISS

Pioneer aviator; founder and present head of the Curtiss companies; some of his early achievements and the trophies he has won

INTRODUCTION

ALL improvements are accepted slowly and with protest by man. New inventions always meet with opposition, advanced ideas with adverse comment. Nevertheless, nothing worth while ever fails to triumph, finally, when its worth is actually proved and recognized by the world.

It is said that the first baby carriage brought with it a storm of protest and scorn. Some even went so far as to predict the death of its occupant and the ultimate destruction of the home as a result of its adoption and use.

It is a fact, too, that laws were passed limiting the speed of the first railway trains to eight miles an hour.

The automobile was believed by some to be only a mechanical aid to suicide. Yet how quickly have all these natural but strangely perverse prejudices against new ways of transportation been dissolved by the ever brightening light of knowledge and progress.

Only three years ago a man made his will, bid his family a tearful farewell, and went aloft with a feeling akin to that supposed to exist in the heart of a soldier going into battle,—but to-day, three years later, how different.

Flying in the air with a heavier-than-air machine is now a fact, an every-day sight, indeed, an every-day business with some already.

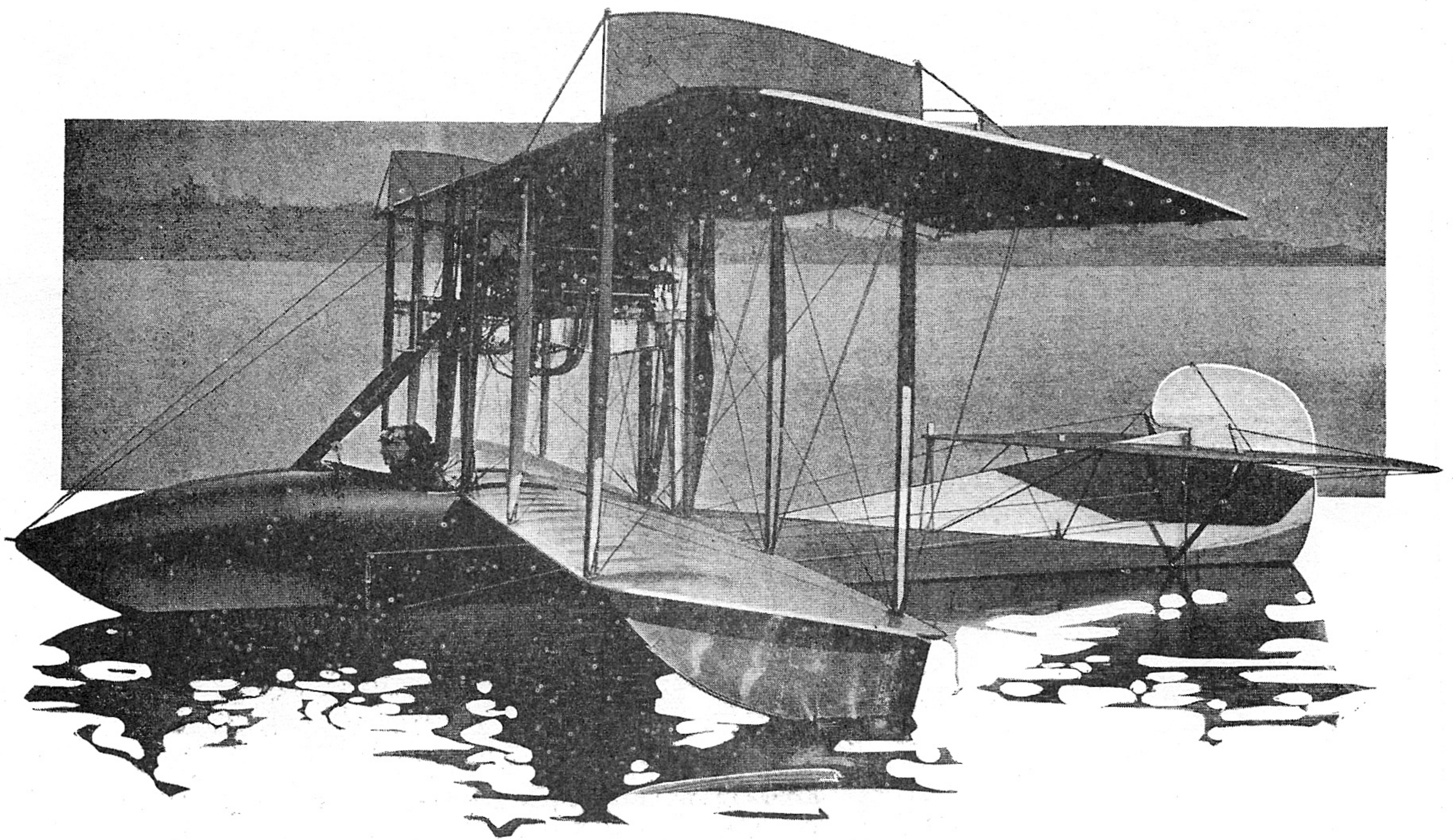
Prejudices and fears, once strong, are rapidly giving place to confidence and pride as the art demonstrates its utility, social and economic worth.

Hundreds of people ascend with no thought of danger: old men, women and even children.

True, there are accidents, occasionally, but seldom are these due to flying alone. Stunts in the air, as on the ground, often result in fatalities; but even these are less frequent than those occurring with other forms of transportation, as can easily be shown by reference to comparative records. Flying is not a hazardous occupation, rather is it a safe one. A few daring pioneers have conquered the air. It is now yours to possess and enjoy.



PHOTO, COURTESY "OUR NAVY MAGAZINE"

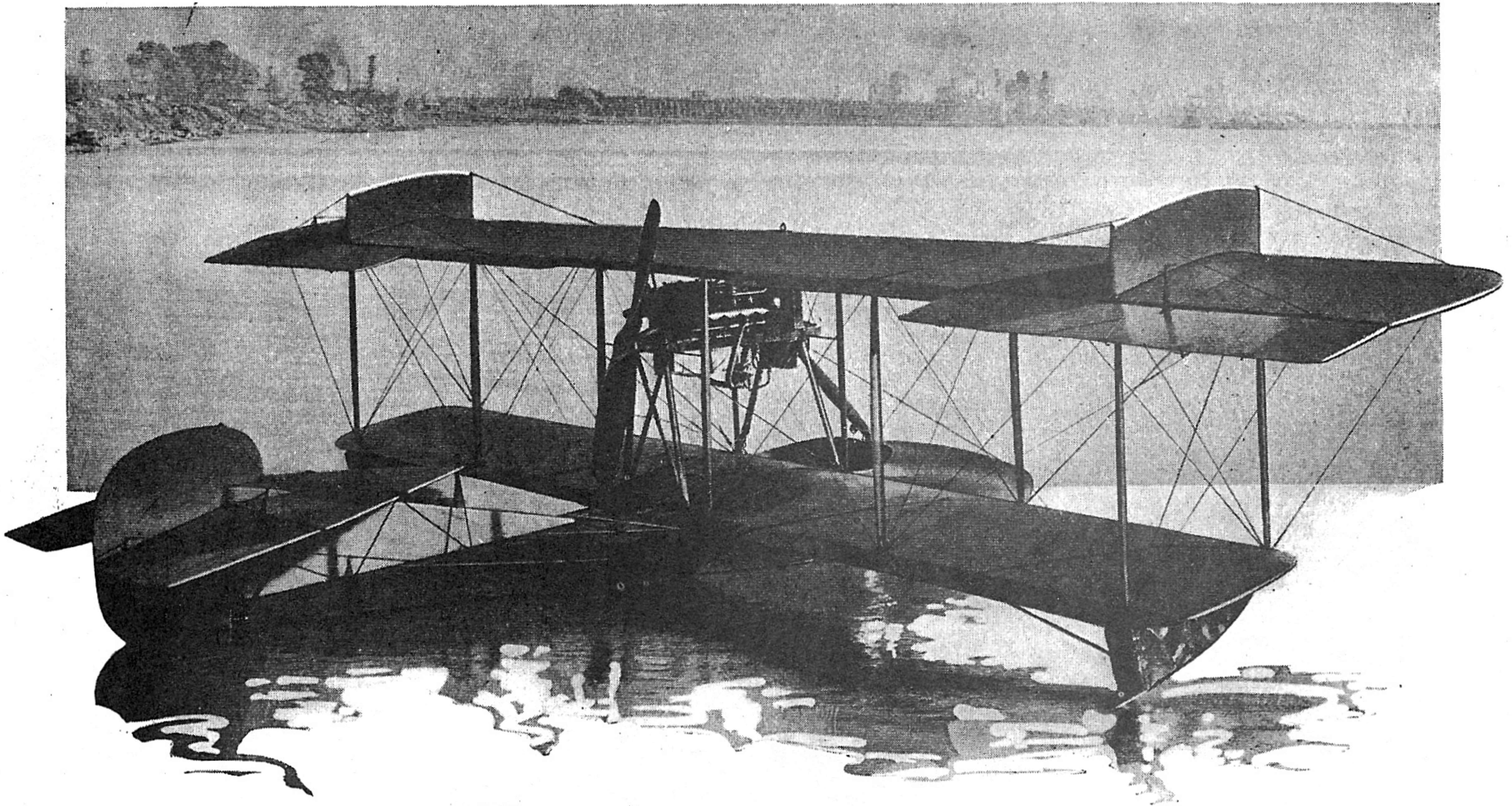


CURTISS MODEL F FLYING BOAT

TO those whose enthusiasm for outdoor sports has, successively, led them through motoring, motor boating, hydro-planing and ballooning, the Curtiss Flying Boat offers the next logical step to new sensations,—new worlds to conquer.

It furnishes a new dimension, a new exhilaration, a wonderful fascination, which cannot fail to thrill and please the most blasé. In the quiet twilight of a summer day what is more sport than, as the last rays of the setting sun begin to turn the upper sky to gold, to jump into a "Flying-Boat" and soar aloft—there to experience that enviable and pleasing sight of seeing the sun set several times in succession. Flying offers sensations new and without number; a new scenery, a new outlook, a new perspective, an enlarged field of vision, which grows suddenly greater as one ascends.

Enabling, as it does, the pilot to choose his own aerial pathway independent of land or water conditions, flying as



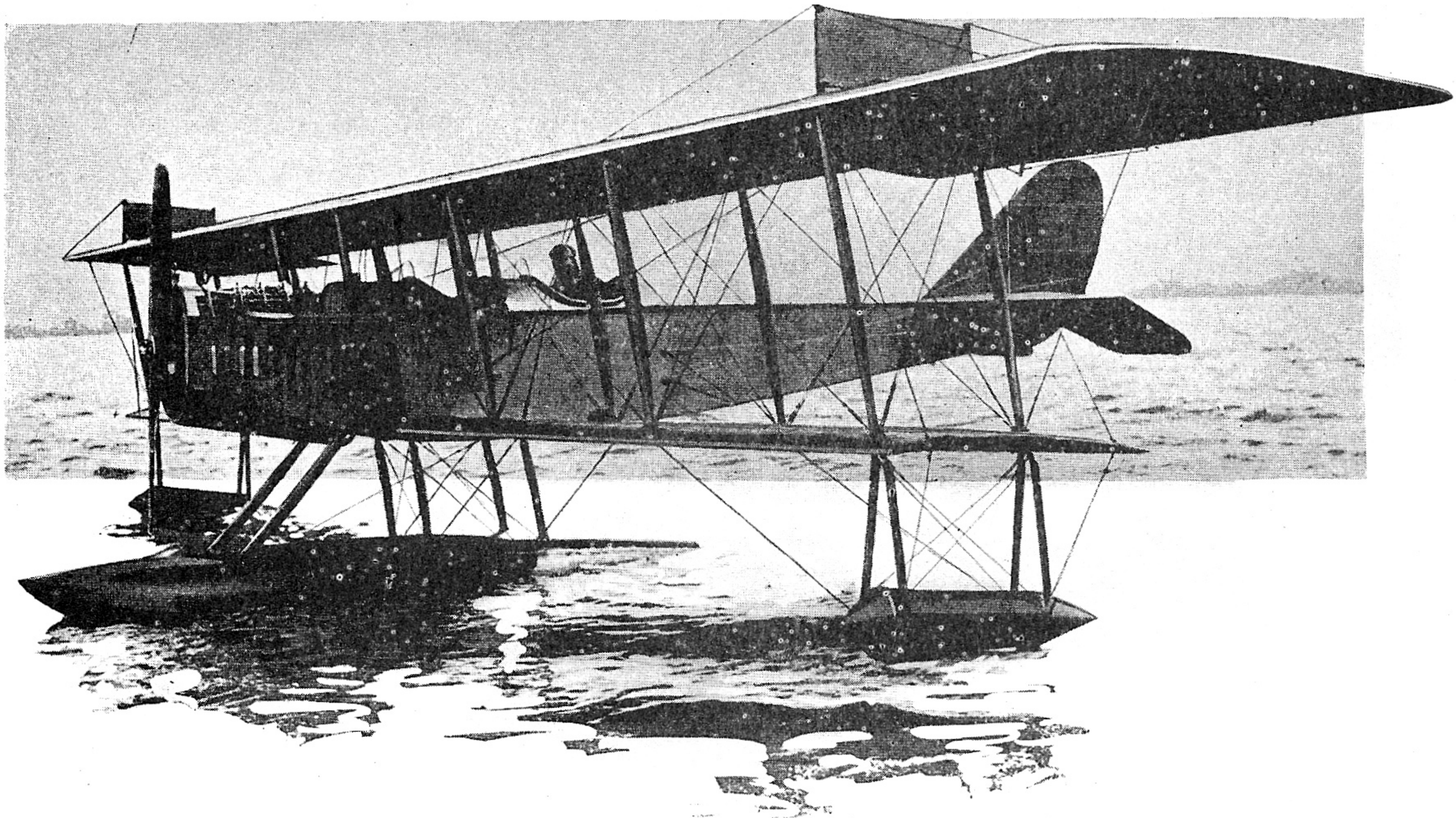
CURTISS MODEL F FLYING BOAT

a sport has an element of satisfaction that all other forms of transportation lack. It has none of the restrictions of terrestrial travel; one is free to come and go as he pleases, like a bird in its native element.

The Curtiss Model F Boat is a type of aerial craft that is easy to fly and easy to land. It will skim over the water like a flying fish, or soar into the clouds like a gull, with the same graceful ease and in less time than its feathered progenitor. It rises from and lands on water with ease and dispatch, even when a considerable sea is running.

Curtiss boats have been flown over 500,000 miles without a serious mishap.

The Model F here shown is the smallest of the Curtiss Flying Boats and was designed primarily as a sportsman's craft. It is of the "pusher" type, has a maximum speed of 65 miles per hour, a minimum speed 45 miles per hour in the air and will climb at the rate of 1,500 feet in 10 minutes. It is built to carry two passengers abreast.



CURTISS MODEL N9—HYDROAEROPLANE

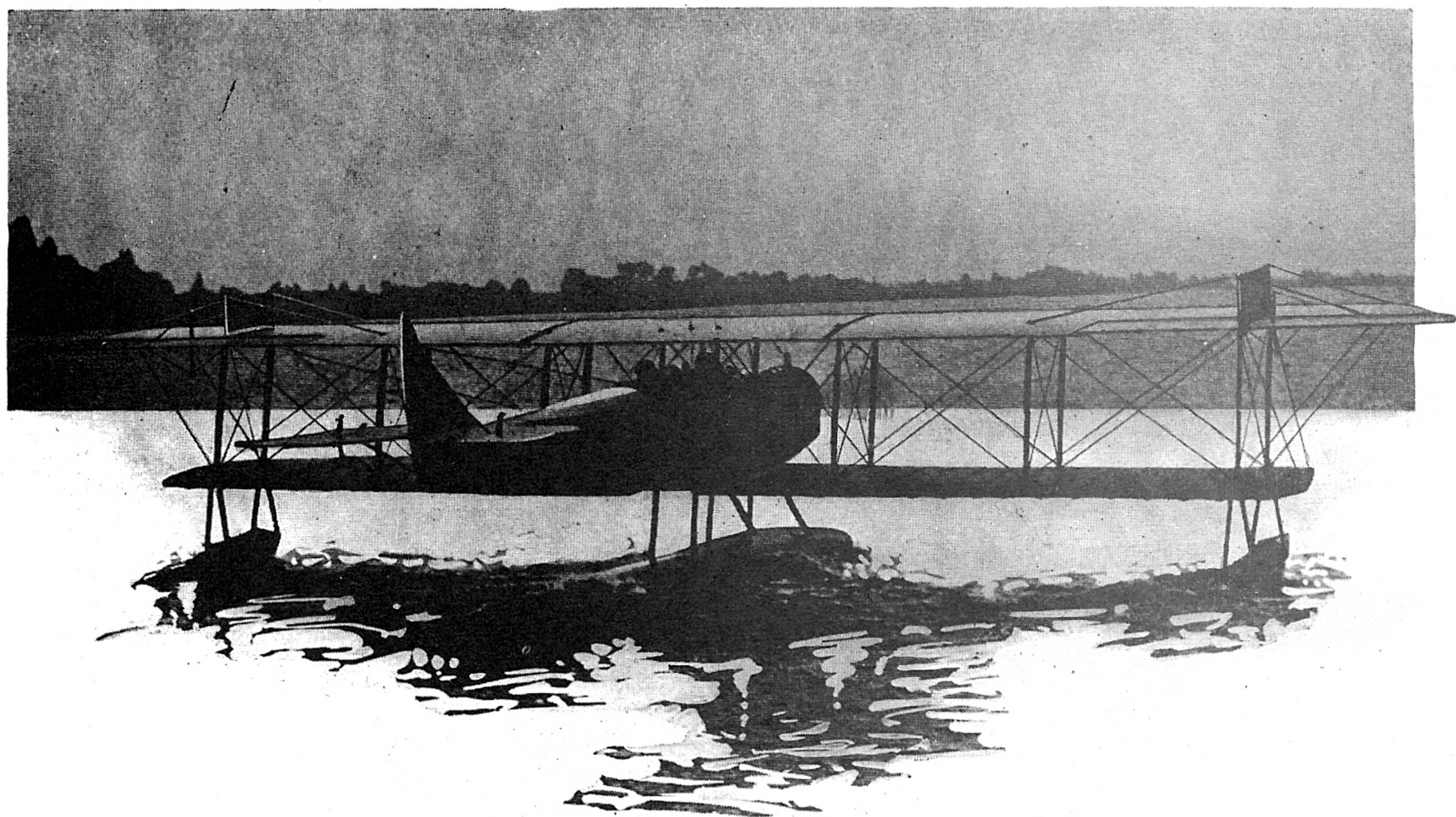
THIS model was designed to meet the Navy's requirements for a water training machine. In its general lines it follows closely the JN4-B land type of military tractor, except that it is, of course, fitted with pontoons in place of wheels.

It is powered with a single Curtiss OXX Motor which develops 100 Horse Power at 1400 R. P. M.

Its maximum wing span is slightly in excess of 53 feet and its overall length is 29 feet, 10 inches. It weighs empty 1,900 pounds and will carry 510 pounds of useful load.

In recent tests held at Newport News it attained a maximum horizontal speed of 70 miles per hour, a minimum flying speed of 45 miles per hour, and climbed 2,000 feet in 10 minutes.

A Hydroaeroplane is peculiarly adapted to scouting purposes and due to its compactness may readily be "knocked-

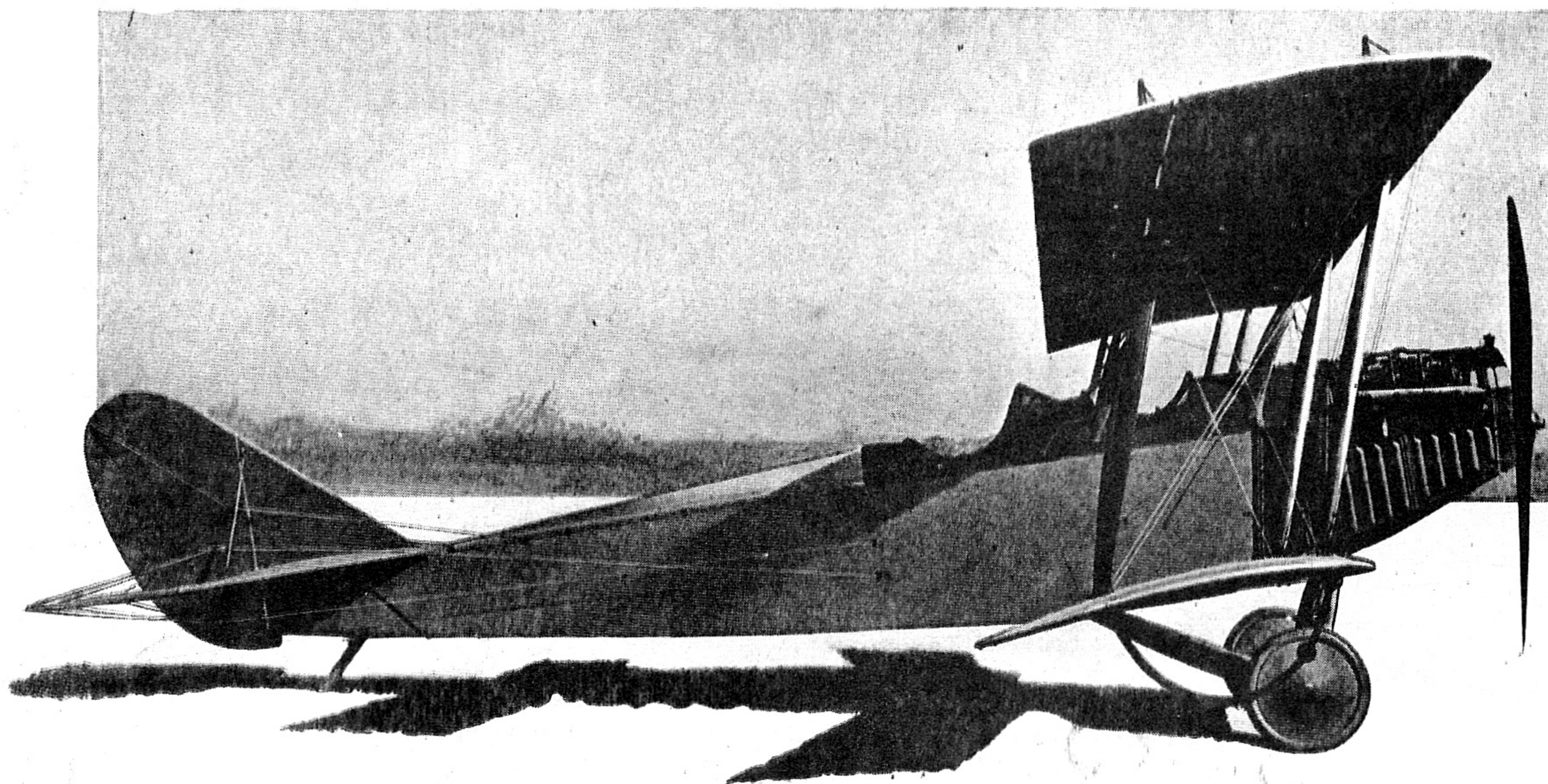


CURTISS MODEL N9—HYDROAEROPLANE

down” and stored on the “mother ship.” It also has all the advantages of the land machine, which it resembles in general form and the arrangement of the control. Then, too, the advantages of the Hydroaeroplane cross-country flying are obvious. Its equipment for alighting on or arising from the water makes it possible for an aviator to follow any water course with ease and safety.

It is not necessary to fly high to be able to select a favorable landing place; one can skim along within a few feet of the surface of the water without danger. It will pass the fastest motor boat ever built and will respond to the rudder more quickly than any water craft afloat. Therefore, for aquatic sport, coast patrol service and general water machine training the Curtiss N9 Hydro is ideal.

The N9 has three pontoons—one central float divided into four water-tight compartments, and two small wing pontoons for balancing in a seaway.

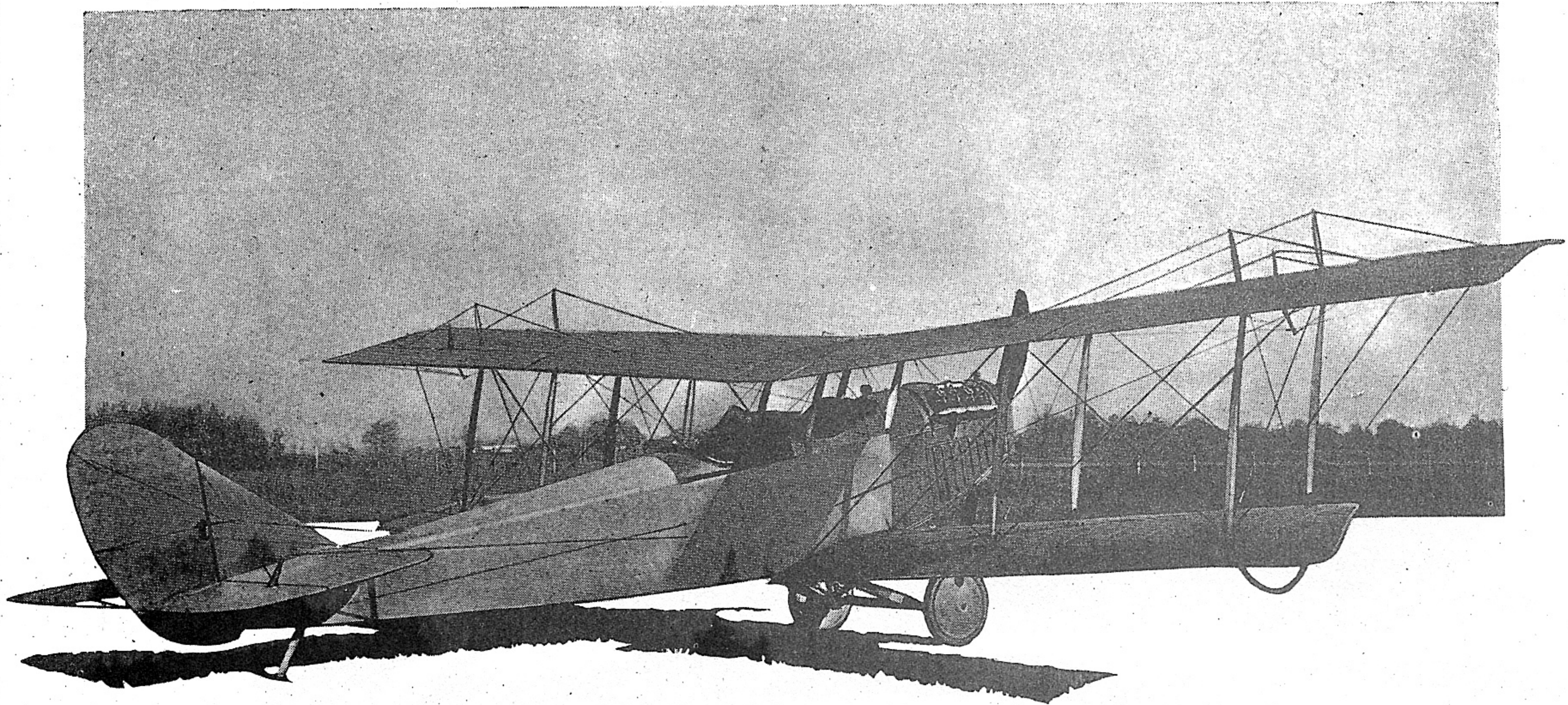


CURTISS MODEL JN4-B—MILITARY TRACTOR

DUE to the fact that this machine has been widely used for training aviators both here and abroad the JN type is probably the best known of all the Curtiss models.

It has a maximum horizontal speed of 75 miles per hour and a minimum of 43 miles per hour, and will climb 3,000 ft. in ten minutes. Powered with an 8-cylinder, "V" type Curtiss "OX" motor, which develops 90 H. P. at 1400 R. P. M. it consumes slightly more than one-half pound of gasoline per H. P. per hour. It is an economical machine for use in training students or general pleasure flying.

It is comparatively light and for its useful load carrying capacity, is very compact. With a wing span of 43 feet, 7 ³/₈ inches and an overall length of 27 feet 3 inches, it weighs empty only 1,405 pounds but will carry a useful load of 485 pounds. It is equipped with dual control, carries two passengers "tandem," each in a separate cockpit.

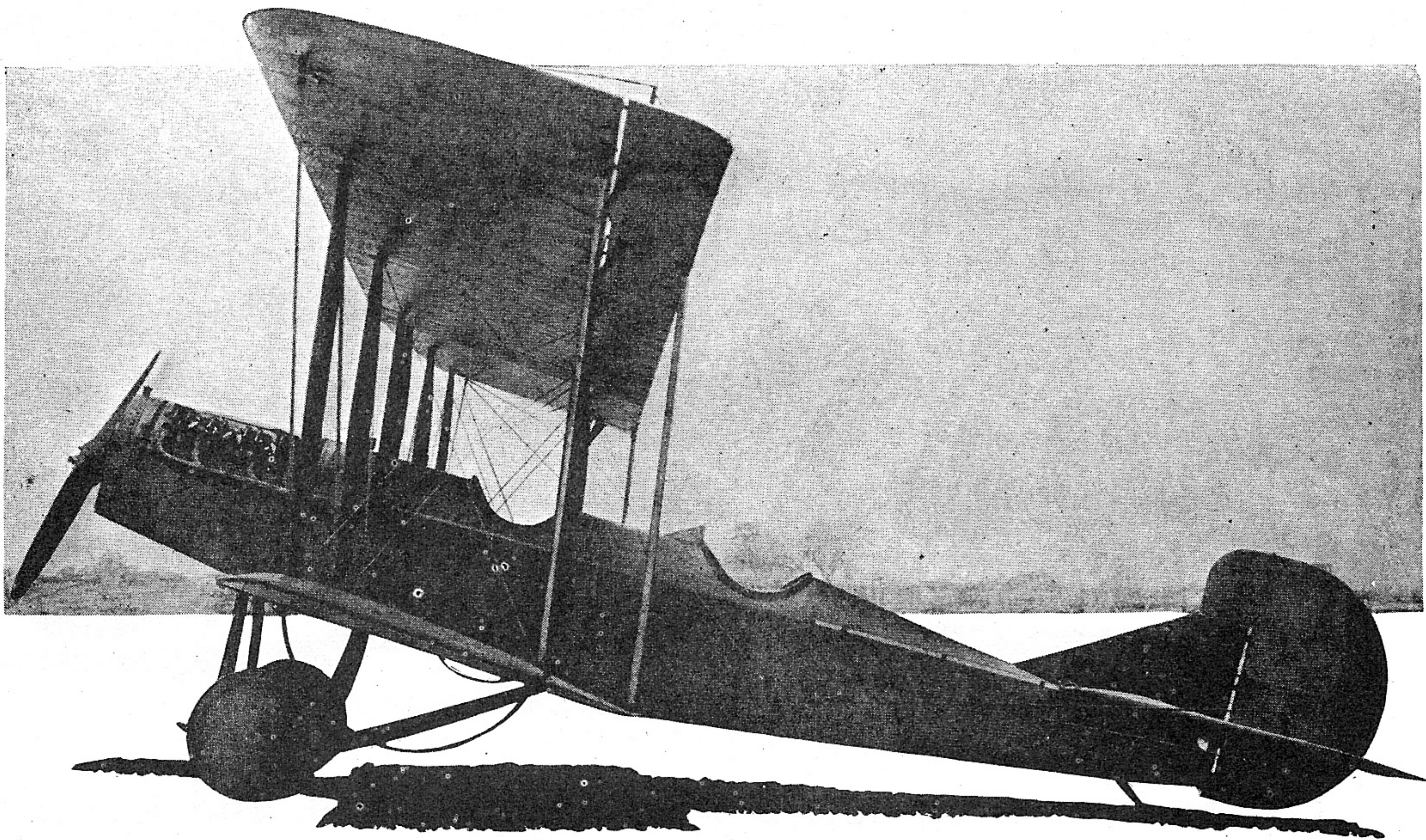


CURTISS MODEL JN4-B—MILITARY TRACTOR

The Curtiss JN has become so generally regarded as an unusually safe machine on account of its rigid construction, its stability in rough weather conditions and its ease of control as demonstrated by Curtiss aviators in competition with others, that it is, in consequence, acknowledged to be the best aeroplane made for training, exhibitions, contests, and other work of this character when flights are expected regardless of weather conditions.

Instructors say that students taking their "solo work" in this machine are later found to be fully qualified to handle much heavier and faster machines without further instruction or practice. For this reason in all Curtiss Schools and in many of the European training camps Curtiss "JN"s are displacing 'planes of other types. A great number are, at the present time, in actual service here and abroad.

The JN4-B is, as are all Curtiss aeroplanes, regardless of size or type, the composite issue of correct theory, fully tested materials, proper design, careful workmanship, accurate assembly and rigid, painstaking inspection.



CURTISS MODEL "R-4"—MILITARY TRACTOR

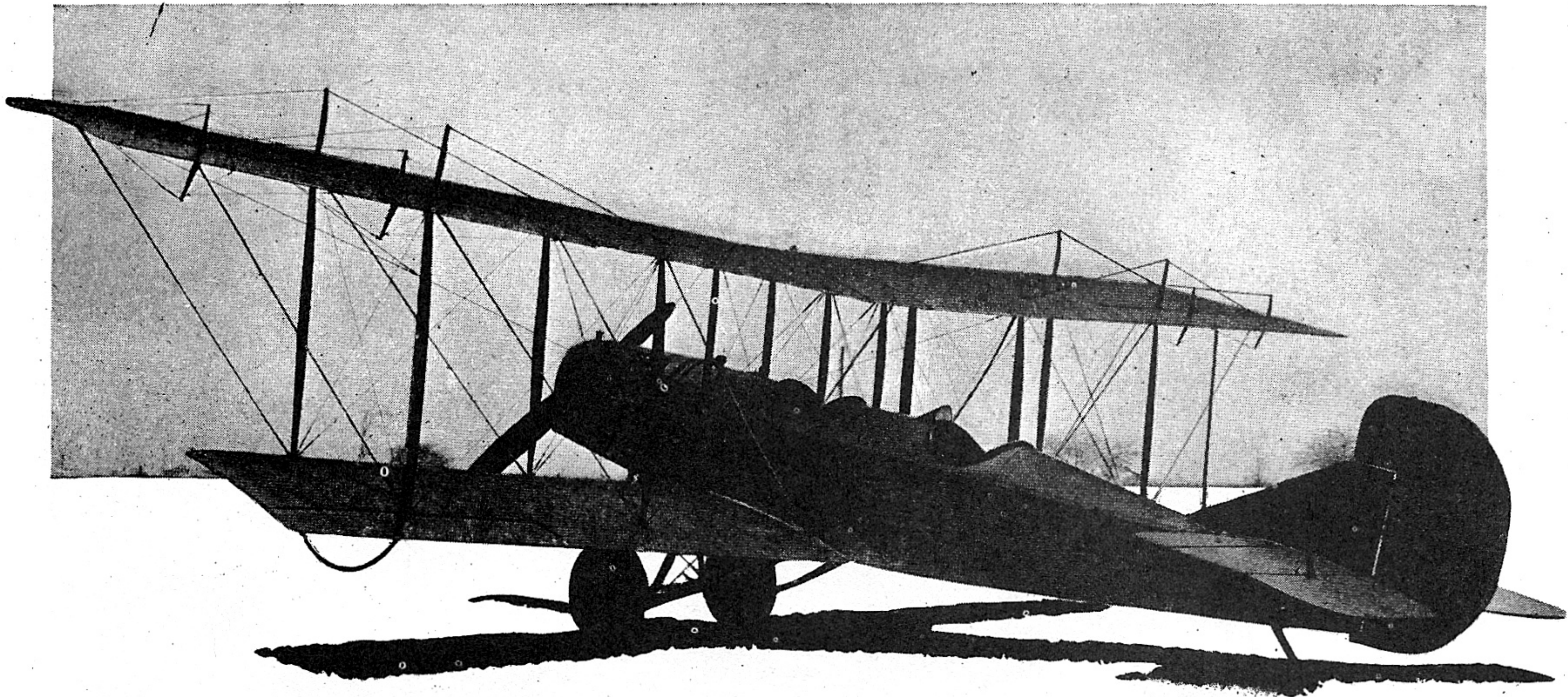
THIS is a much larger machine than the "JN" type, having a wing spread slightly in excess of 48 feet and an area of sufficient size so that a total of 1020 pounds, useful load, of which 625 pounds may be fuel, can be carried.

It is powered with a Curtiss Model "V2" motor, which develops 200 H. P. at 1400 R. P. M.

Its maximum horizontal speed is 90 miles per hour and its minimum horizontal speed is 48 miles per hour. It climbs 4000 feet in 10 minutes.

Due to its excess horse power and large wing surface it is capable of great speed and possesses unusual carrying capacity.

In its design are embodied the most modern features of up-to-date construction and its high efficiency has warranted its use under circumstances where lighter and less powerful machines have been found to fail.



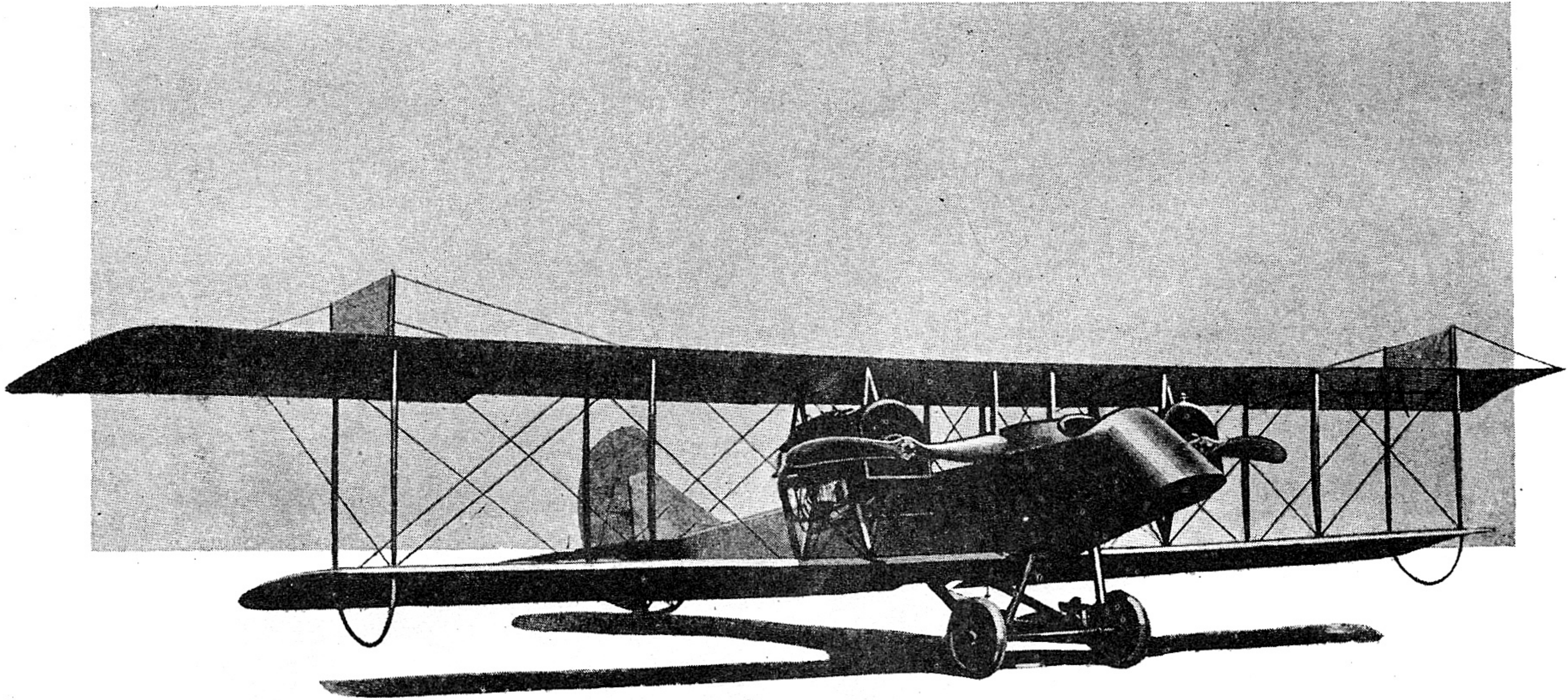
CURTISS MODEL "R-4"—MILITARY TRACTOR

This machine is equipped with dual control, and is built to carry two passengers "tandem"—each in a separate cockpit.

It was with this style of aeroplane that records were established last year for speed and cross-country passenger carrying in flights from Newport News to Washington, D. C., and return, and from Newport News to New York City.

With a modified R₄—a larger wing area required to give extra gasoline carrying capacity—Victor Carlstrom also recently flew from Chicago to New York City.

As a "bomber," mail carrier, general utility machine, its rugged construction and great weight carrying ability have made the Curtiss Model R₄ a favorite among military men and scores of these tractors are reported to be in actual service in the war zone to-day. Several more are in U. S. Army services on the Border, where they are proving to be dependable, efficient, aerial carriers.



CURTISS MODEL TWIN JN—MILITARY TRACTOR

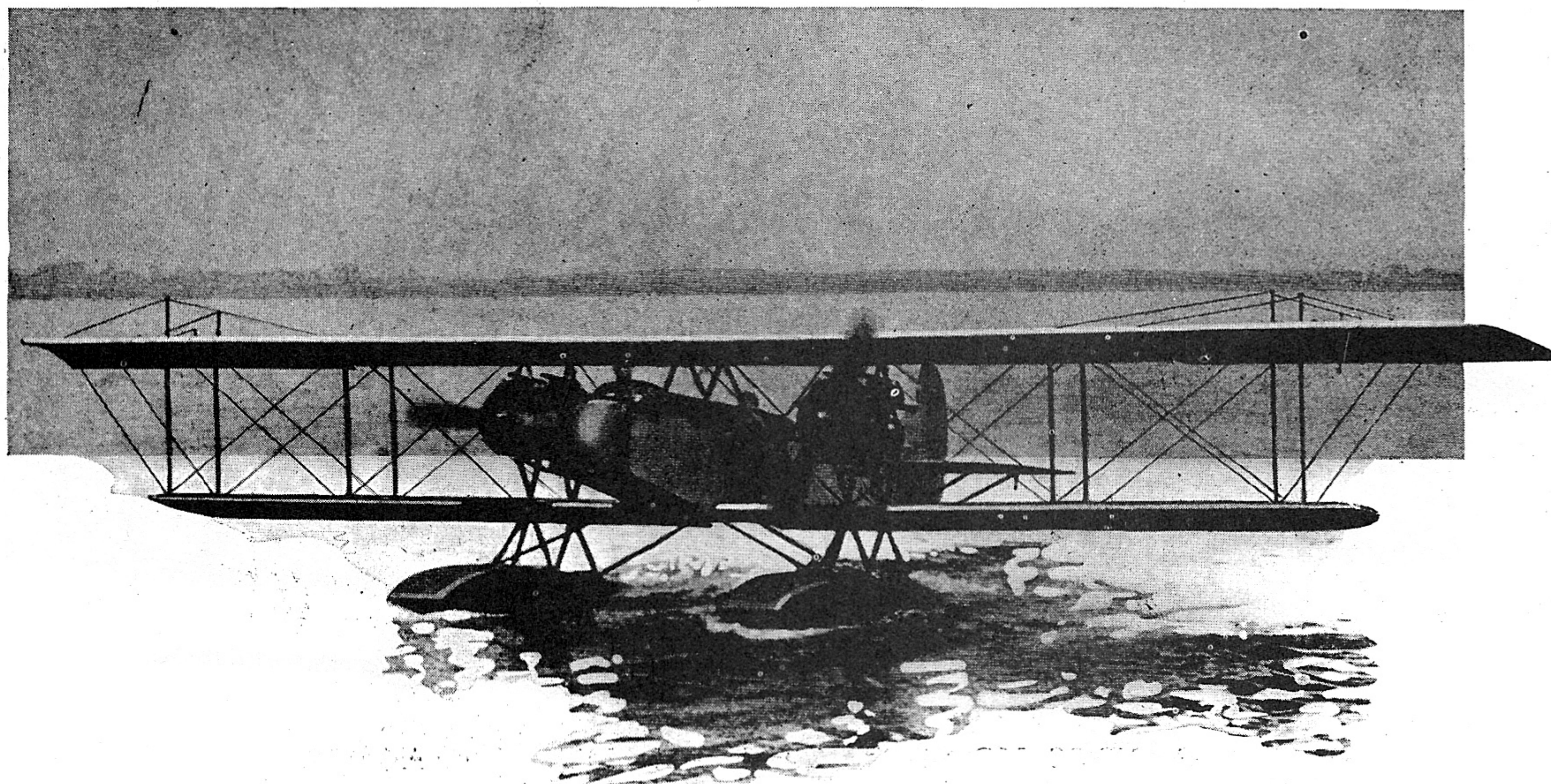
THE Curtiss Model JN Twin-motored Tractor possesses all the inherent advantages which go to make up a successful military aeroplane. It has high maximum speed and fast climbing ability combined with a slow landing speed and great weight carrying capacity. Although it weighs but 2,110 pounds, empty, it has a useful load carrying capacity of 1,040 pounds.

Two Curtiss Model "OXX" 8-cylinder motors, one located to the left and the other to the right of the fuselage, give this battleplane an available 200 horse power.

It has a maximum horizontal flight speed of 85 miles per hour, a minimum of 48 miles per hour, and a climbing speed under normal conditions, of 4,000 feet in 10 minutes. The machine will fly and climb on one motor.

The front cockpit is placed in the nose of the fuselage, giving to the observer or gunner seated therein an unobstructed range of vision and an extensive field of fire.

The twin-motored machine possesses several advantages over the single-motored type. The two propellers, turning



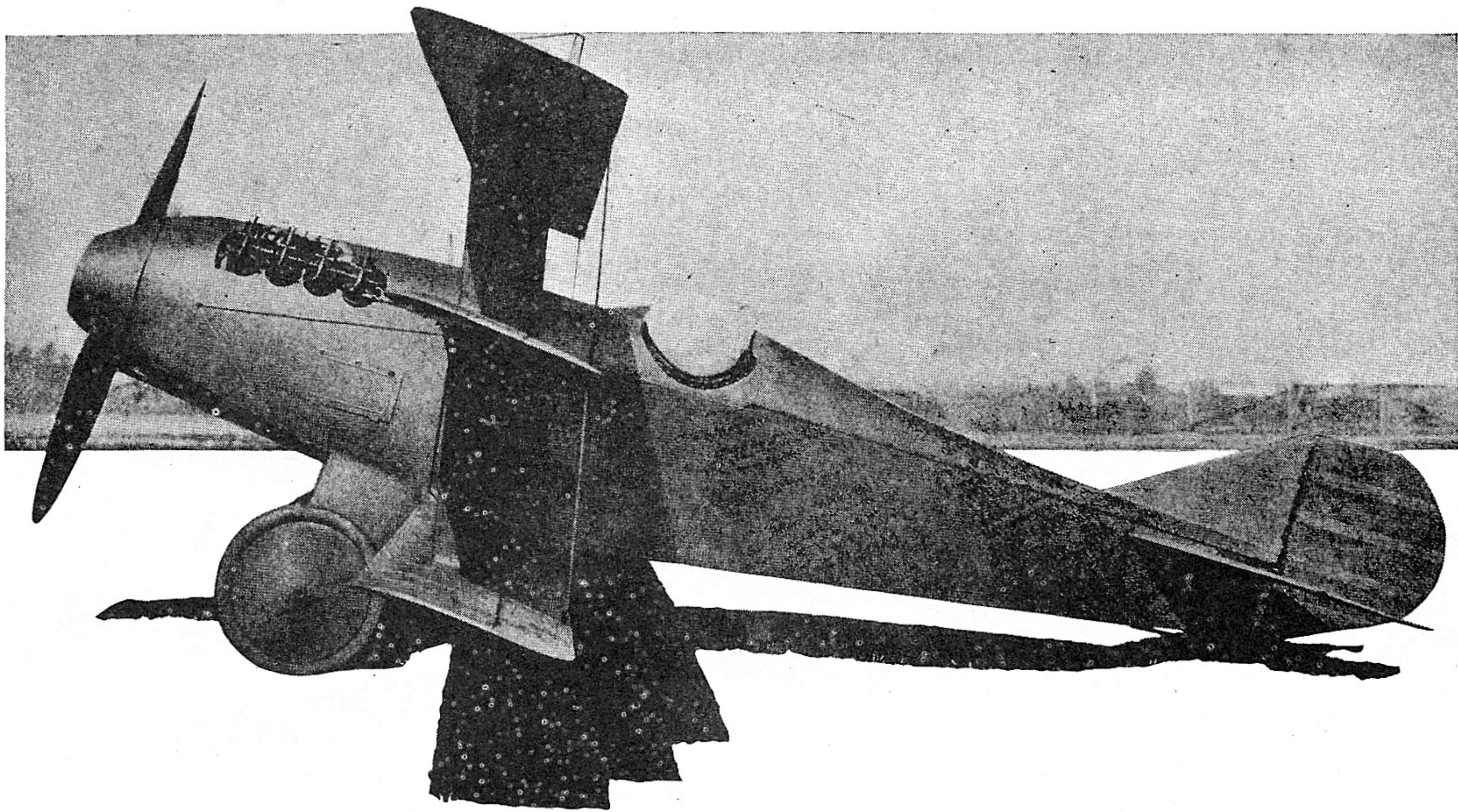
CURTISS MODEL TWIN JN—HYDROAEROPLANE

clockwise and counter-clockwise, respectively, result in equalized torque and gyroscopic effects. The air streams which they produce also have a tendency to make the machine readily controllable under power. Without power, this machine assumes a moderate gliding angle which permits an easy and safe landing.

Another advantage gained by the use of two motors is a decrease, relatively, in the air resistance to the progress of the aeroplane through it. Because there is a smaller, total projected area of the machine lying in the propeller "slip streams" less power is consumed in overcoming head resistance and the surplus thus saved can be utilized for increasing speed or useful load carrying capacity.

By using twin motors it is also possible to equip with greater power without resorting to excessive propeller sizes and speeds.

The Curtiss Twin JN can also be furnished as a hydro by substituting, for its landing gear, a set of pontoons.



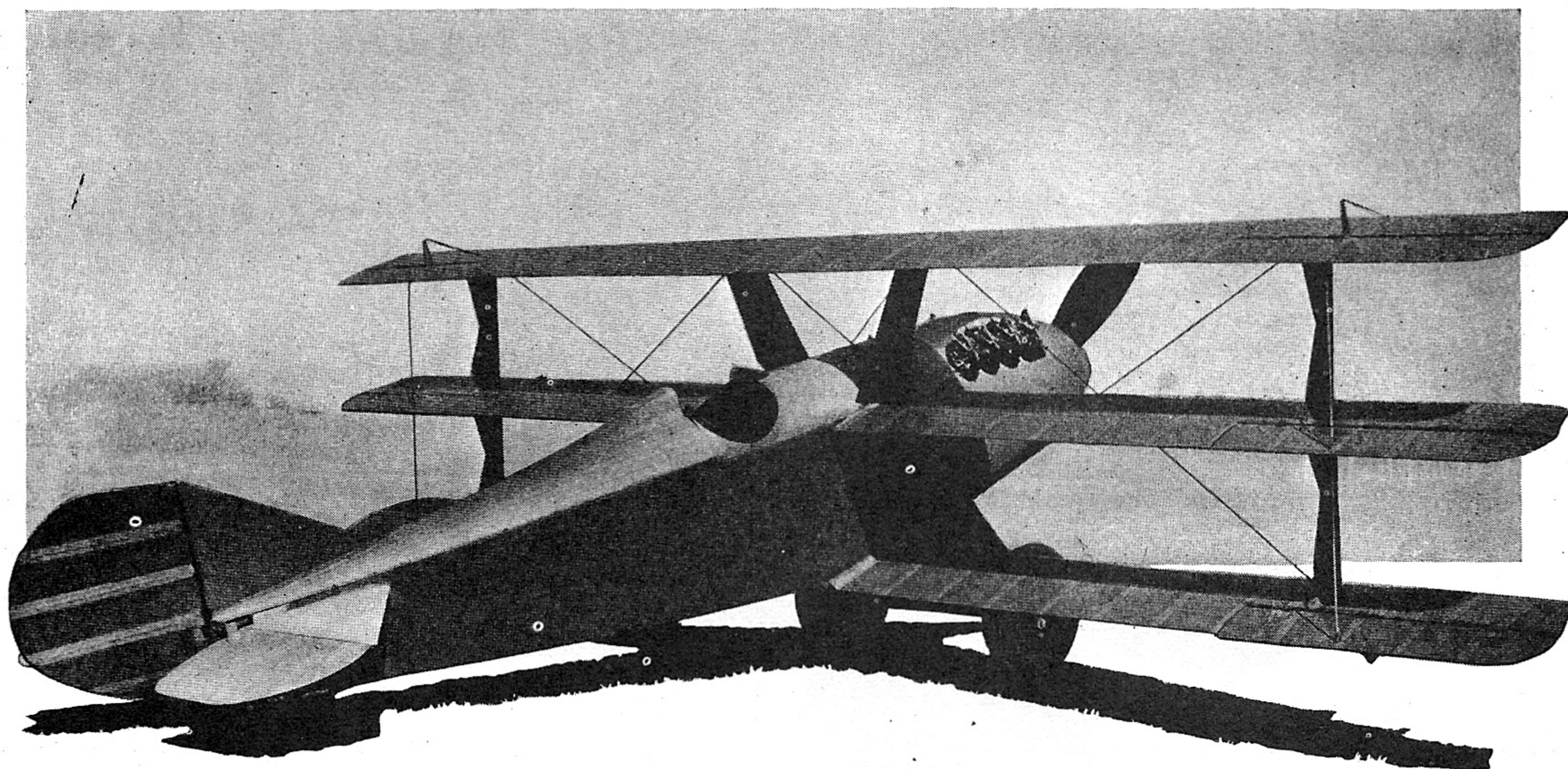
CURTISS MODEL S3—TRIPLANE SPEED SCOUT

THE Curtiss Triplane Speed Scout is essentially a one-man machine designed for speed and great climbing ability. Inasmuch as its safety in war, like that of the Torpedo Boat Destroyer in the Navy, depends upon its ability to dart here and there, with a swiftness that precludes successful pursuit, this little craft is so compacted in size and so intensely powered as to be able to make the maximum speed of 115 miles per hour; yet it will fly at the slow speed of 55 miles per hour.

Under normal conditions, it is able to leave the ground in less than 300 feet and it has frequently, in tests, been made to climb 9,000 feet in 10 minutes.

Due to its small size it rapidly becomes imperceptible to the eye after it has been in the air a few minutes. At 5,000 feet it is barely a dot; at 10,000 feet it is out of sight to the average human eye.

It has a total wing spread of 25 feet and an overall length of 19.5 feet and stands less than 9 feet high. It differs quite



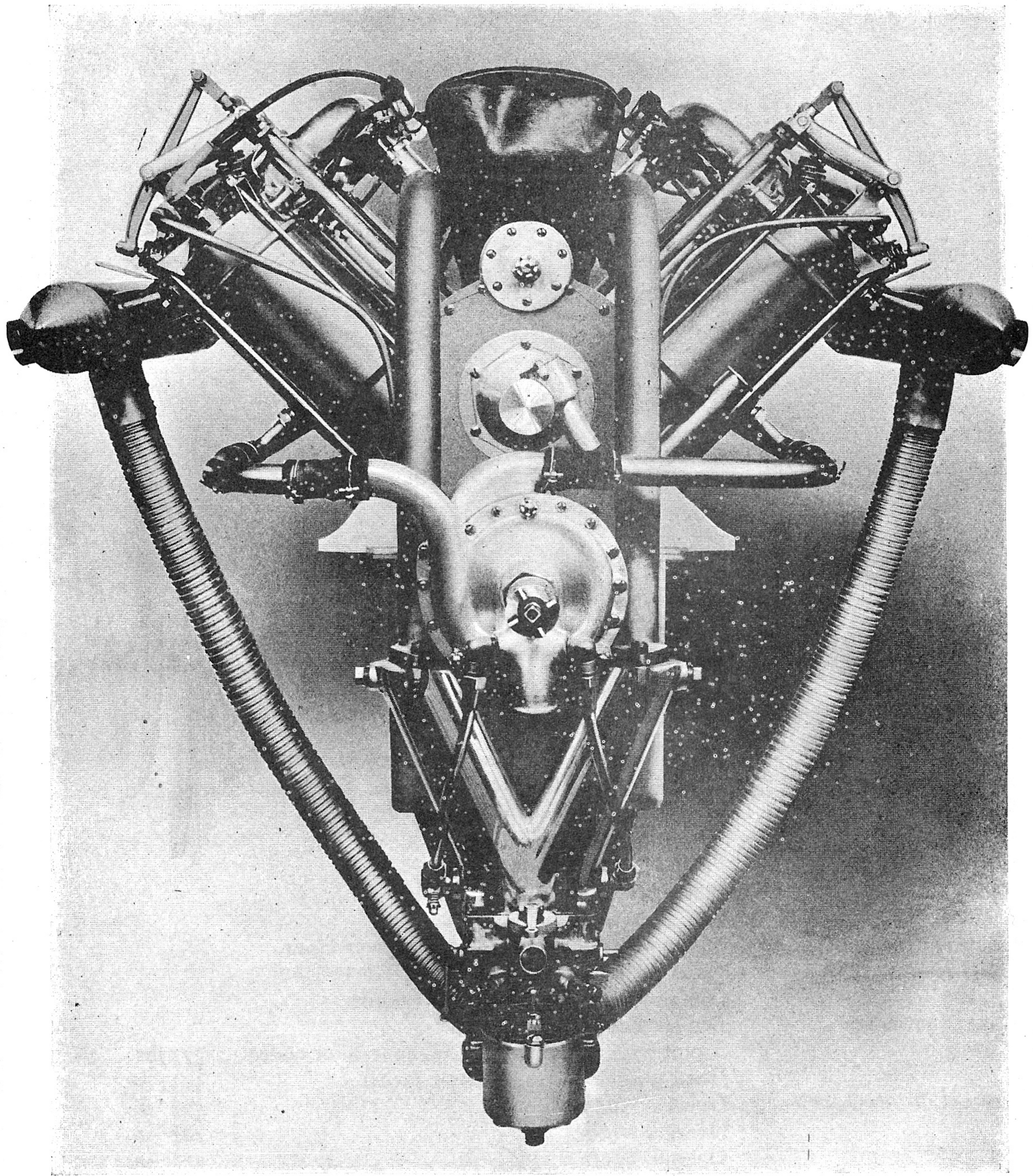
CURTISS MODEL S3—TRIPLANE SPEED SCOUT

materially, in general construction, from any of the other Curtiss models, not only in its triplane wing design but in the style of struts, bracing and general assembly. The entire fuselage is covered and even the propeller hub is fitted with a truncated, streamline hood, which assists in cutting down the wind head-resistances.

Victor Carlstrom, the well-known aviator, says it is one of the nimblest machines he has ever handled. He, easily, attained an altitude of 16,500 feet with it on its second trial flight.

Equipped with wireless it can be made a wonderful aerial observation point and, for military reconnaissance and fast scouting work, promises to excel any other machine so far produced.

As an "Aerial Runabout" or "Speedplane" it cannot fail to please the sportsman aviator. Its trim triplane construction, its well formed streamline fuselage, its speed and ease of handling make it the center of attraction wherever it lands.

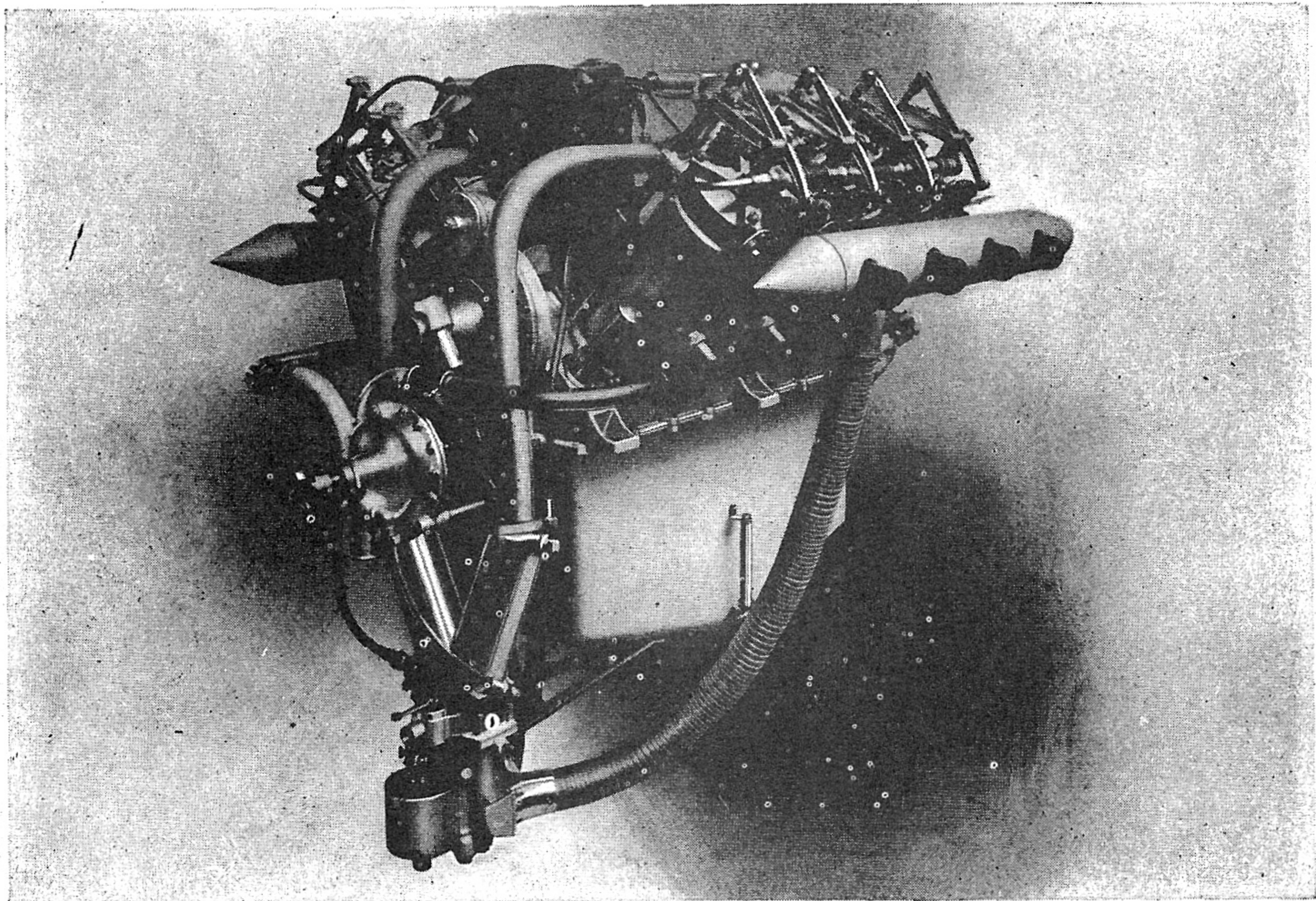


CURTISS "OX" MOTOR

MODEL
OX

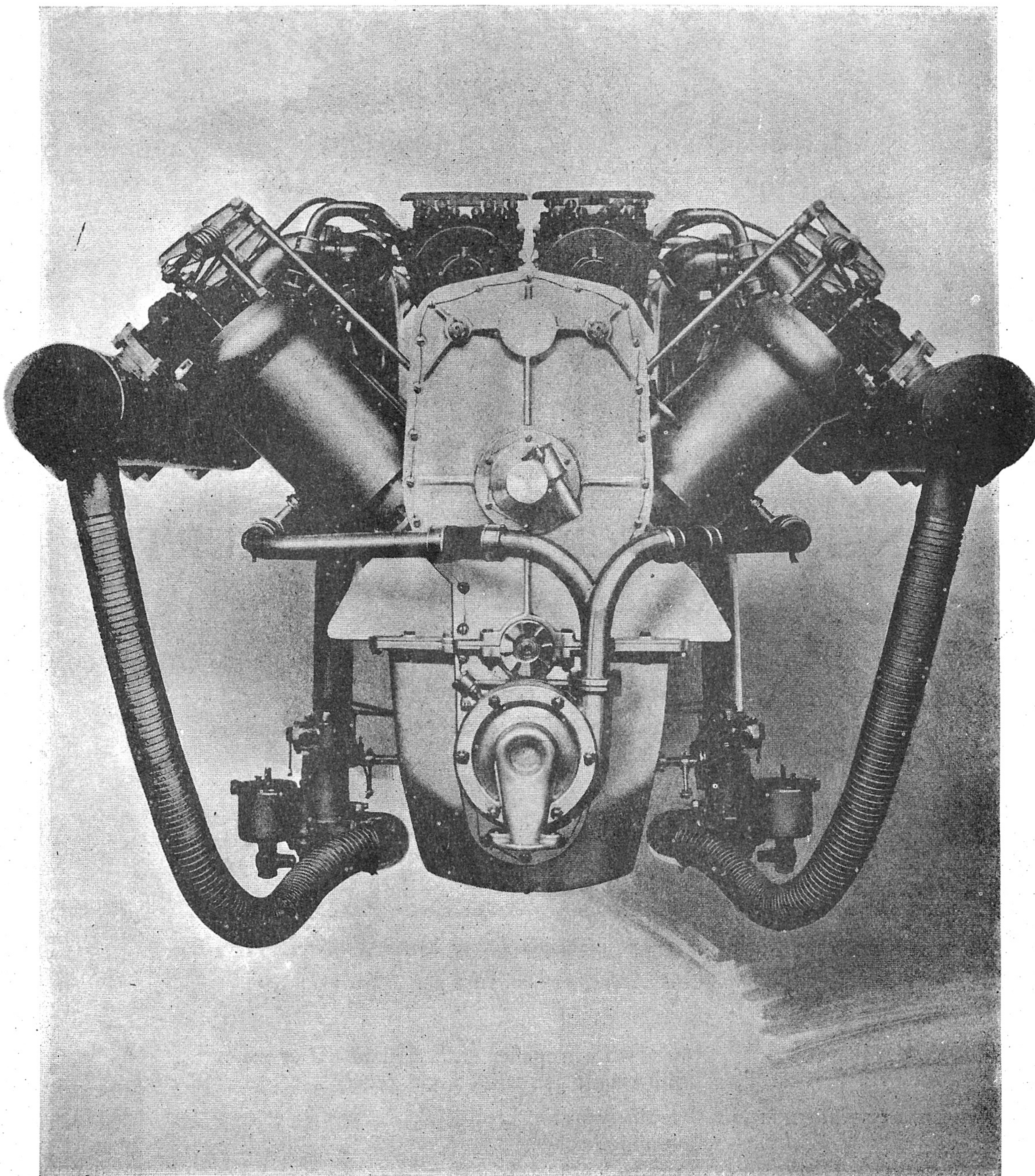
OXX ($\frac{1}{4}$ INCH LARGER BORE THAN "OX")

RATED
90 H. P.
100 H. P.



GENERAL DESCRIPTION OF CURTISS MODEL OX MOTOR

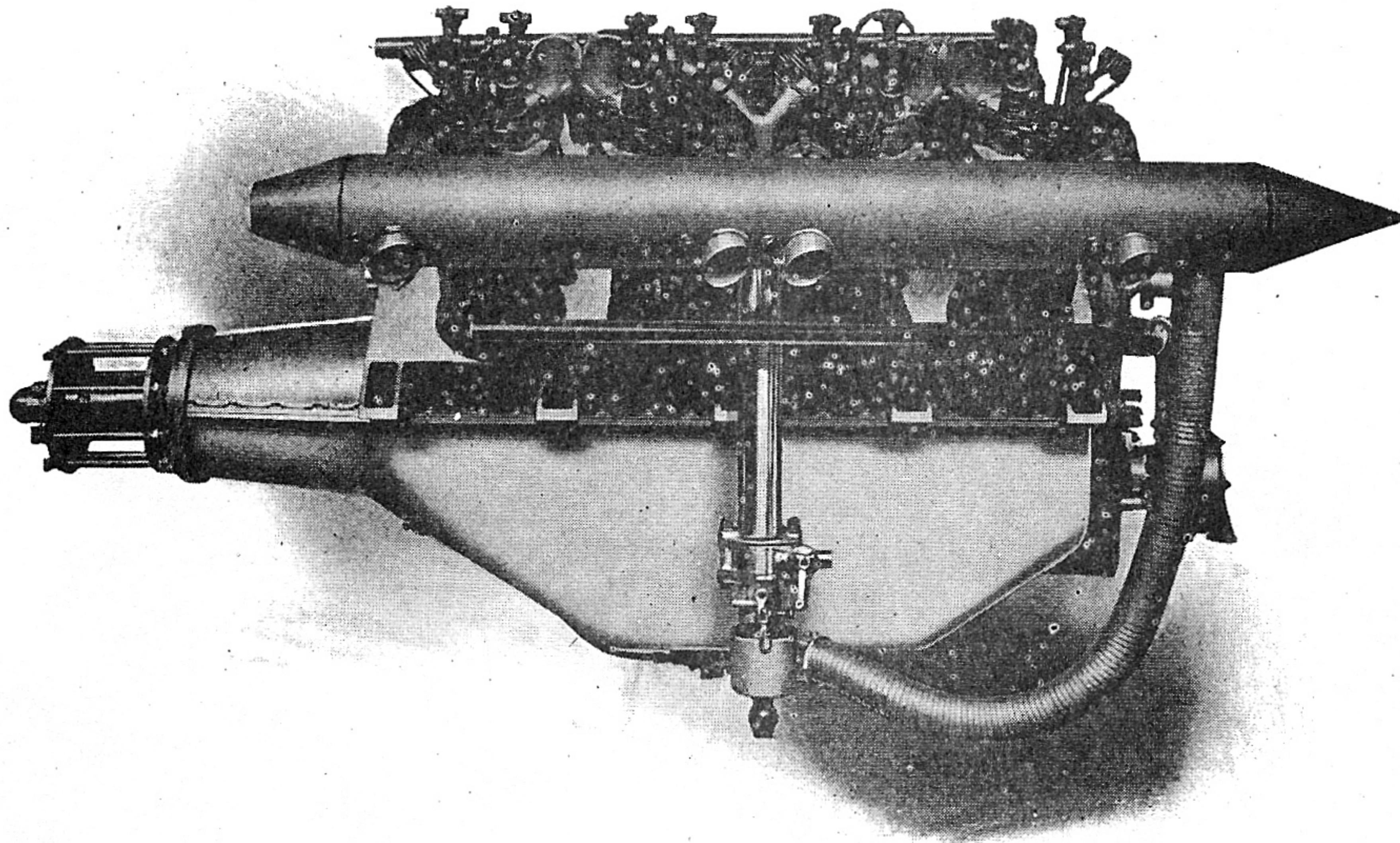
TYPE	Eight-cylinder, Vee, four stroke cycle.	
HORSE POWER	(Rated) 90 H. P. at 1400 R. P. M. See Power Curve.	
IGNITION	High tension, 8-cylinder magneto.	
COOLING	Water—centrifugal pump.	
OILING	Force feed to all bearing.	
BORE	Four inches.	
STROKE	Five inches.	
GASOLINE CONSUMPTION	0.60 pounds per Brake Horse Power-Hour.	
OIL CONSUMPTION	0.030 pounds per Brake Horse Power-Hour.	
VALVES	One intake, one exhaust per cylinder.	
CARBURETOR	Duplex Zenith.	
WEIGHTS	Motor with propeller hub, without oil or water	375 lbs.
	Dead weight per rated horse power	4.17 lbs.
INSTALLATION DIMENSIONS	Overall, length	56 $\frac{3}{4}$ in.
	Overall, width	29 $\frac{3}{4}$ in.
	Overall, depth	36 $\frac{3}{4}$ in.
	Width at bed	12 $\frac{7}{8}$ in.
	Height from bed	17 $\frac{3}{4}$ in.
	Depth from bed	12 $\frac{1}{8}$ in.
	At carburetor	19 in.
	Bed Bolts (c to c)	12 $\frac{5}{8}$ in.
EQUIPMENT	Tools, Shipping Box.	
EXTRA EQUIPMENT	Other parts on special order.	



CURTISS "V2" MOTOR

MODEL
V2

RATED
200 H. P.

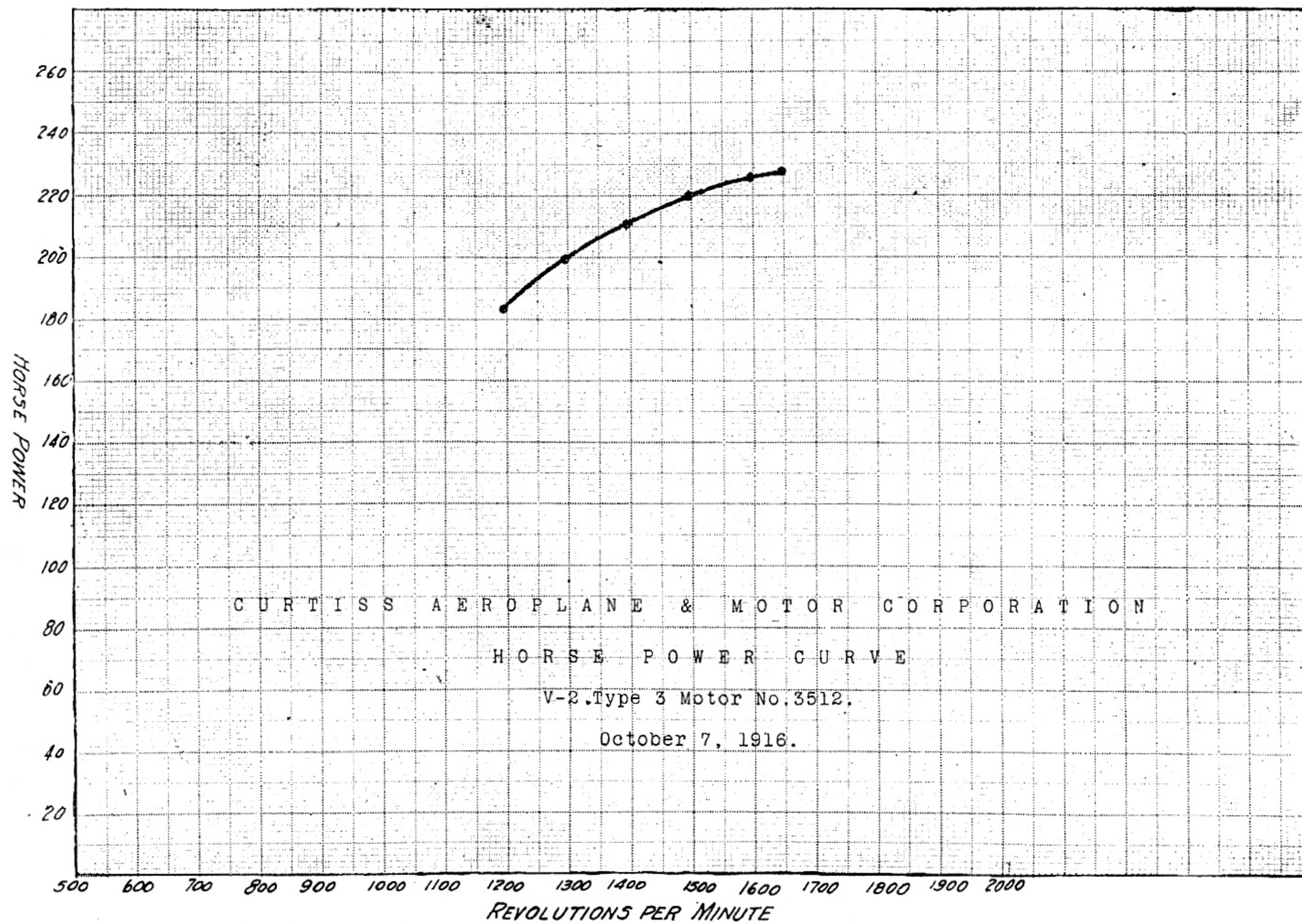


GENERAL DESCRIPTION OF CURTISS MODEL V2 MOTOR

TYPE	Eight-cylinder, Vee, four stroke cycle.	
HORSE POWER	(Rated) 200 H. P. at 1400 R. P. M.	
IGNITION	Double—two high tension, 8-cylinder magnetos.	
COOLING	Water—centrifugal pump.	
OILING	Force feed to all bearings.	
BORE	Five inches.	
STROKE	Seven inches.	
GASOLINE CONSUMPTION	0.54 pounds per Brake Horse Power-Hour.	
OIL CONSUMPTION	0.030 pounds per Brake Horse Power-Hour.	
VALVES	One intake, one exhaust per cylinder.	
CARBURETORS	Two Zeniths.	
WEIGHTS	Motor with propeller hub, without oil or water	690 lbs.
	Dead weight per rated horse power	3.45 lbs.
INSTALLATION DIMENSIONS	Overall, length	67 $\frac{1}{8}$ in.
	Overall, width	37 in.
	Overall, depth	34 $\frac{3}{8}$ in.
	Width at Bed Bolts	15 $\frac{3}{4}$ in.
	Height from bed	20 $\frac{1}{4}$ in.
	Depth from bed	13 $\frac{1}{8}$ in.
	Bed Bolts (c to c)	9 in.
EQUIPMENT	Tools and Shipping Box.	
EXTRA EQUIPMENT	Other parts on special order.	

DETAILS OF CURTISS MODEL V2 MOTOR

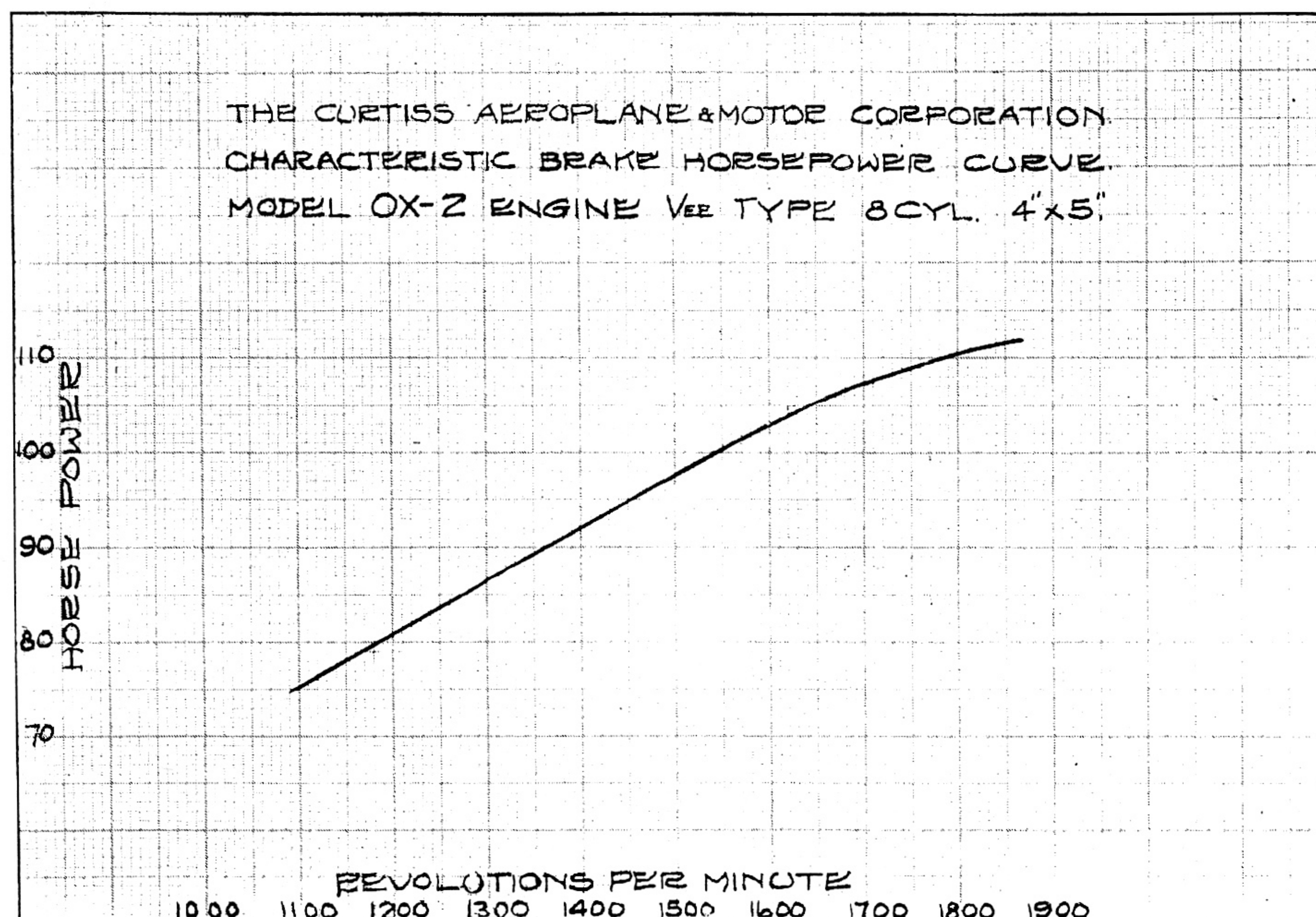
IGNITION	Two high tension 8-cylinder single spark magnetos with separate sets of spark plugs and wiring. Magnetos are located at top of crank case and driven off timing gears through flexible coupling. One magneto fires inner line of spark plugs, the other the outer. Spark advances interconnected. Leather boots on magnetos. Rubber covers on spark plugs. Spark plugs on 18 mm. diameter and $1\frac{1}{2}$ mm. pitch.
CARBURETION	Two "Zenith" carburetors with separate manifolds. Each one supplies one bank of four cylinders through water jacketed induction pipes and cast aluminum manifolds. Inter-connected throttles. Auxiliary air intake for altitude adjustment. Carburetors are located on each side of crank case and are supported by steel struts to crank case. Carburetor floats arranged at 90 degrees to longitudinal axis of the engine to insure proper and uniform flow of gasoline to motor during variation of ascent or descent angle.
LUBRICATION	Pressure feed to all bearings—oil is forced by rotary gear pumps from oil reservoir to rear of hollow cam shaft and from this point to following units in the given order: Cam-shaft bearings, timing gears, crank-shaft bearings, connecting-rod bearings, piston pins and cylinder walls. Return by gravity to imperforate partition thence through drain tubes to drain pump and back to oil sump. The oil is screened before entering both pumps by removable screens. Pump is readily detachable. Oil pressure regulating valve fitted to removable plate at base of pump. Nominal pressure at 1400 R. P. M. (Crank shaft) equals sixty pounds.
WATER CIRCULATION	Duplex centrifugal pump. Each pump circulates water separately from radiator around each set of four cylinders and return. Water pump is studded to gear end of crank-case and driven by enclosed gears from crank shaft.
CYLINDERS	Steel forgings, machined all over. Top wall of water jacket welded on. Monel metal side wall, welded on. Cylinder wall ribbed on inside of jacket for strength. Cylinders bolted to crank case by twelve studs. Cylinders staggered.
VALVES	Poppet type in head. Intake, nickel steel. Exhaust, tungsten steel.
VALVE SPRINGS	Special steel, heavily nickel plated. Intake, coil type. Exhaust, cantilever type.
VALVE CAGES	Intake; cast aluminum with cast-iron valve stem bushing. Exhaust, cast-iron ribbed outside for cooling and strength. Valve seats in cylinder heads. Exhaust valve cage contains hole for priming.
ROCKER ARMS	"H" section forging, case-hardened all over and nickel plated. Valve clearance adjustment on upper end of push rod.
PUSH RODS	Barrel type, tubular rod with ball end at valve lifter. Yoked end adjustable on threaded portion of rod, and locked by lock nut and cotter.
CAM FOLLOWERS	Plunger type; steel, case-hardened and ground.
CAM FOLLOWER GUIDES	Bearing, bronze. Studded to case by two studs.
CAM-SHAFT	Drilled hollow. Drop forged with cams integral. Separate cam for each valve. Cams, case-hardened. Five bearings. All wearing surfaces ground. Guides, manganese bronze; studded to case.
CAM-SHAFT BEARINGS	Aluminum alloy castings. Split type bolted together and held in crank case by locked screw.
PISTONS	Aluminum alloy die castings, flat-head type, deep ribbed for strength and cooling. Piston pin bearings are in piston without bushings. Two cast-iron eccentric rings.
PISTON PINS	Chrome vanadium steel—drilled hollow, case-hardened and ground. Tube spun inside to permit all oil to flow through pin bearings to cylinder walls. Pins pressed in connecting rods and held by large locked set screw through connecting rod.
CONNECTING RODS	Chrome vanadium steel. H-beam forgings, machined all over and heat treated. Copper oil tube from lower to upper bearing held by clamps riveted on.
CONNECTING-ROD BEARINGS	Bronze backed, babbitt lined. Reamed to crank shaft. Ribbed construction at side to retain oil.



CRANK-SHAFT	Chrome nickel steel forging, finished all over and drilled hollow and heat treated. Four throw, five main bearings. All bearings ground. End of shaft tapered one in ten with twelve splines for propeller hub.
CRANK-SHAFT BEARINGS	Bronze backed, babbitt lined. Line reamed to running clearance of crank-shaft.
THRUST BEARINGS	Large annular ball-bearing and double-thrust ball-bearing for tractor or pusher use without change. Bearings mounted in aluminum housing bolted in crank case. Lubricated from hollow crank-shaft.
CRANK CASE	Aluminum alloy casting. Box type ribs. Ten motor support arms. Lower half bolted on. Timing gear housing cast integral.
TIMING GEARS	Spur type. Crank-shaft gear steel forging, shrunk and keyed on shaft. Cam-shaft gear, special manganese bronze, keyed on cam-shaft and held with retaining cap screw.
MAGNETO DRIVE	Steel idler driven off cam-shaft gear. Drives both magneto gears. All these gears have ball-bearing shafts. Flexible connections between magnetos and gear shafts.
WATER PUMP	Centrifugal type with duplex inlets and outlets. Cast aluminum housing and blades. Gear driven off crank-shaft. Studded to front end of crank case.
OIL PUMP	Rotary gears comprising three independent pumps, one for feed and two for drain, located in lower half of case driven from timing gears.
INTAKE MANIFOLDS	Brass tubing.
EXHAUST PIPES	Steel tubes bolted to exhaust ports.
WATER PIPING	Brass tubing, nickel-plated. Rubber hose connections with special clamps.
BOLTS, NUTS, ETC.	All nuts and screws are securely locked, cotter pinned and wired in series.
EXTRA EQUIPMENT	Can be furnished on special order: Exhaust manifold, welded steel stamping held by single bolt through each end exhaust pipe. Muffler, special streamline muffler bolted to exhaust manifold. Air pump, drive from cam shaft at front end of motor, capacity 0.332 cubic feet of air per minute against four pounds per square inch pressure above one atmosphere at 1400 R. P. M., crank-shaft speed. Tachometer drive; special gearing enclosed in aluminum housing screwed to air pump, or gear case (if air pump is not specified), driven from cam-shaft gear.

DETAILS OF CURTISS MODEL OX MOTOR

IGNITION	One high tension, single spark, 8-cylinder magneto located at top of crank case and driven off timing gears at front. Leather boot on magneto. Rubber covers on spark plugs. Spark plugs metric thread 18 mm., $1\frac{1}{2}$ mm. pitch.
CARBURETOR	Duplex "Zenith." Each intake supplies one bank of four cylinders through separate manifolds. Lower end of manifolds water jacketed. Auxiliary air intake in manifolds with hand control for altitude adjustment. Carburetor located under front end of motor, and braced by steel struts to crank case.
LUBRICATION	Pressure feed. The oil is forced from lowest point of sump by gear-pump to rear end of hollow cam-shaft, through pressure adjusting valve through cam-shaft to timing gears and all cam-shaft bearings, thence through tubes to crank-shaft bearings and through crank-shaft throws to connecting-rod bearings. Gravity return to splash pan, and oil reservoir. Oil pump is located at bottom of propeller end of crank case and is driven off crank-shaft through bevel gear. Removable oil screen at lowest point of sump. Oil pressure from forty to sixty pounds at 1400 R. P. M.
WATER CIRCULATION	Centrifugal pump bolted to propeller end of crank case and driven direct off end of crank-shaft through coupling.
CYLINDERS	Best grade grey iron casting, each casting embodying one cylinder with valve chambers and valve stem guides cast integral. Monel metal jackets brazed on. Outside of cylinder heavily nickel-plated to prevent rust. Cylinders bolted to crank case by eight nickel steel, heat-treated studs, four of which extend to top of cylinder.
VALVES	Poppet type in head. Intake, nickel steel. Exhaust, tungsten steel.
VALVE SPRINGS	Coil Type.
VALVE CAGES	Valves seat direct in cylinder head casting.
ROCKER ARMS	Exhaust, drop forgings, case-hardened and nickel-plated. Intake cast aluminum.
CAM FOLLOWERS	Plunger type, case-hardened steel.
CAM FOLLOWER GUIDES	Manganese bronze, bolted to case.
CAM SHAFT	Steel, case hardened. Eight double acting cams integral. Five bearings drilled hollow for oiling system, bearings and cams ground.
CAM-SHAFT BEARINGS	Aluminum alloy castings. Split type bolted together and held in crank case by locked set screw.
PISTONS	Aluminum alloy castings with deep ribs for strength and cooling. Two cast-iron eccentric rings.
PISTON PINS	Chrome nickel steel, heat treated. Drilled hollow, case-hardened and ground. Pin bearings in aluminum of piston bosses. Pins pressed in connecting rods and held by locked set screw.
CONNECTING RODS	Chrome Vanadium steel forgings, "H" section machined all over and heat treated.
CONNECTING-ROD BEARINGS	Bronze backed, babbitt lined. Reamed for crank-shaft. Held in rod by four brass rivets. Cap bolted on with two bolts.
CRANK-SHAFT	Heat-treated chrome nickel steel forging, finished all over and drilled hollow. Four throw, five main bearings. All bearings ground. End of shaft splined, tapered and threaded for propeller hub.
CRANK-SHAFT BEARINGS	Bronze backed, babbitt lined. Line reamed to crank-shaft. End caps aluminum, others steel. All caps held on with two large bolts.



- THRUST BEARING Large annular and thrust ball-bearing mounted in extended rear end of crank case. By reversing bearing, engine may be converted from tractor to pusher type.
- CRANK CASE Aluminum alloy casting with heavy deep-ribbed decks. Six motor support arms. Lower half bolted on.
- TIMING GEARS Spur type. Crank-shaft gear steel forging shrunk and keyed on shaft. Cam shaft gear special manganese bronze, keyed on cam-shaft and held with retaining cap screw.
- MAGNETO DRIVE Steel-gear driven from cam shaft gear at each end. Ball bearing mounted. Flexible coupling to magneto shaft.
- WATER PUMP Centrifugal type. Cast aluminum housing, bronze blades.
- TACHOMETER DRIVE Shaft gearing in aluminum housing bolted on face of timing gear housing. Dog drive direct off cam shaft gearing.
- EXHAUST PIPE Steel tubes bolted to exhaust ports.
- WATER PIPING Steel tubing, nickel-plated. Reinforced rubber hose connections with special clamps.
- BOLTS, NUTS, ETC. All nuts, screws, etc., are cotter pinned or lock wired in series.
- EXTRA EQUIPMENT Can be furnished on special order:
Exhaust manifolds, welded steel stampings held by single bolt through end exhaust pipes.
Muffler—special streamline muffler bolted to exhaust manifold.
Air pump—drive from cam shaft at front end of motor. Capacity—0.332 cubic feet of air per minute against four pounds per square inch pressure above one atmosphere at 1400 R. P. M crank-shaft speed.
Starting lever—manual starting device operating through dog clutch to crank-shaft, positive safety device to disengage clutch. Aluminum bracket bolted to engine bed.

SPECIFICATIONS

CURTISS MODEL S3 TRIPLANE MILITARY SCOUT

GENERAL DIMENSIONS:

Wing Span—Upper Plane	25 ft.
Wing Span—Middle Plane	25 ft.
Wing Span—Lower Plane	25 ft.
Depth of Wing Chord	24 in.
Gap between Wings	30 in.
Stagger	9½ degrees
Length of Machine overall	19 ft. 6 in.
Height of Machine overall	8 ft. 7¼ in.
Angle of Incidence	3½ degrees
Dihedral Angle—dihedral on upper 0 in.; dihedral, lower	4½ degrees
Sweepback	0 degrees
Wing Curve	R. A. F. No. 6
Horizontal Stabilizer-Angle of Incidence	0 degrees

AREAS:

Wings—Upper	50.00 sq. ft.
Wings—Middle	46.33 sq. ft.
Wings—Lower	46.33 sq. ft.
Horizontal Stabilizer	7.10 sq. ft.
Vertical Stabilizer	2.30 sq. ft.
Elevator (each 3.70 sq. ft.)	7.40 sq. ft.
Rudder—Vertical	5.30 sq. ft.
Total Supporting Surface	142.66 sq. ft.
Loading (weight carried per sq. ft. of Supporting Surface)	9.25 lbs.

WEIGHTS:

Net Weight—Machine Empty	970 lbs.
Gross Weight—Machine and Load	1320 lbs.
Useful Load—	350 lbs.
Fuel	155 lbs.
Oil	30 lbs.
Pilot	165 lbs.
Total	350 lbs.

SPECIFICATIONS—CONTINUED

PERFORMANCE:

Speed—Maximum—Horizontal Flight	115 miles per hour
Speed—Minimum—Horizontal Flight	55 miles per hour
Climbing Speed	9,000 feet in 10 minutes

MOTOR:

Model OXX—8-Cylinder, Vee, Four-Stroke Cycle	Water cooled
Horse Power—(Rated) at 1400 R. P. M.	100
Bore and Stroke	4 $\frac{1}{4}$ in. x 5 in.
Fuel Tank Capacity	25 gals.
Oil Capacity Provided—Crankcase	4 gals.
Fuel Consumption per Brake Horse Power per Hour	0.60 lbs.
Oil Consumption per Brake Horse Power per Hour	0.030 lbs.

PROPELLER:

Material	Wood
Pitch—according to requirements of performance.	
Diameter—according to requirements of performance.	
Direction of Rotation (viewed from pilot's seat)	Clockwise

DETAILS:

Control Braces of tail units not exposed to wind draft.
 Triple Ailerons.
 Landing Gear Wheel, size 26 in. x 3 in.
 Standard Equipment—Tachometer, oil gauge, gasoline gauge; complete set of tools.
 Other equipment on special order.

SPECIFICATIONS

CURTISS MODEL TWIN JN—MILITARY TRACTOR

GENERAL DIMENSIONS:

Wing Span—Upper Plane	52 ft. 9 $\frac{3}{8}$ in.
Wing Span—Lower Plane	43 ft. 1 $\frac{3}{4}$ in.
Depth of Wing Chord	59 $\frac{1}{2}$ in.
Gap between Wings	62 $\frac{1}{2}$ in.
Stagger	9 $\frac{1}{2}$ degrees
Length of Machine overall	29 ft. 4 in.
Height of Machine overall	10 ft. 8 $\frac{1}{2}$ in.
Angle of Incidence	2 degrees
Dihedral Angle	4 $\frac{1}{2}$ degrees
Sweepback	0 degrees
Wing Curve	Eiffel No. 36
Horizontal Stabilizer-Angle of Incidence	0 degrees

AREAS:

Wings—Upper	218 sq. ft.
Wings—Lower	197 sq. ft.
Ailerons (each 17.64 sq. ft.)	35.28 sq. ft.
Horizontal Stabilizer	40.40 sq. ft.
Vertical Stabilizer	7.10 sq. ft.
Elevators (each 13.30 sq. ft.)	26.60 sq. ft.
Rudder	18 sq. ft.
Total Supporting Surface	450.28 sq. ft.
Loading (weight carried per sq. ft. of Supporting Surface)	7.00 lbs..
Loading (per B. H. P.)	15.44 lbs.

WEIGHTS:

Net Weight—Machine Empty	2110 lbs.
Gross Weight—Machine and Load	3150 lbs.
Useful Load—	1040 lbs.
Fuel	650 lbs.
Oil	60 lbs.
Pilot	165 lbs.
Passenger or other Load	165 lbs.
Total	1,040 lbs.

SPECIFICATIONS—CONTINUED

PERFORMANCE:

Speed—Maximum—Horizontal Flight	85 miles per hour
Speed—Minimum—Horizontal Flight	48 miles per hour
Climbing Speed	4,000 feet in 10 minutes

MOTORS:

Model OXX—Two 8-Cylinder, Vee, Four-Stroke Cycle . . .	Water cooled
Horse Power—(Rated) at 1400 R. P. M. (100 H. P. each) .	200
Weight per rated Horse Power.	4.01 lbs.
Bore and Stroke	4 $\frac{1}{4}$ in. x 5 in.
Fuel Consumption per Hour.	20 gals.
Fuel Tank Capacity	105 gals.
Oil Capacity Provided—Crankcase (each motor 4 gals.) . .	8 gals.
Fuel Consumption per Brake Horse Power per Hour (each motor 0.60 lbs.)	1.20 lbs.
Oil Consumption per Brake Horse Power per Hour (each motor .030 lbs.)060 lbs.

PROPELLER:

Material	Wood
Pitch—according to requirements of performance.	
Diameter—according to requirements of performance.	
Direction of Rotation (as viewed from pilot's seat).	{ Left motor—Clockwise Right motor—Anti-clockwise

DETAILS:

Circular Radiators.
 Wings Skids at outer end of lower panels.
 Tail Skid independent of Tail Post.
 Landing Gear Wheel, size 32 in. x 4 $\frac{1}{2}$ in.
 Standard Equipment—Tachometer, oil gauge, gasoline gauge; complete set of tools.
 Other equipment on special order.
 The above machine is also built as a hydroaeroplane equipped with two main pontoons in place of landing gear.

SPECIFICATIONS

CURTISS MODEL R4—MILITARY TRACTOR

GENERAL DIMENSIONS:

Wing Span—Upper Plane	48 ft. 4 $\frac{1}{8}$ in.
Wing Span—Lower Plane	38 ft. 5 $\frac{1}{8}$ in.
Depth of Wing Chord	75 $\frac{1}{16}$ in.
Gap between Wings	74 $\frac{1}{4}$ in.
Stagger	10 $\frac{3}{4}$ in.
Length of Machine overall	28 ft. 11 $\frac{3}{4}$ in.
Height of Machine overall	13 ft. 2 $\frac{1}{4}$ in.
Angle of Incidence	2 $\frac{1}{2}$ degrees
Dihedral Angle	3 degrees
Sweepback	0 degrees
Wing Curve	R. A. F. No. 6
Horizontal Stabilizer-Angle of Incidence	0 degrees

AREAS:

Wings—Upper	257.34 sq. ft.
Wings—Lower	193.18 sq. ft.
Ailerons (upper, 16.92; lower, 10.26)	54.36 sq. ft.
Horizontal Stabilizer	40.40 sq. ft.
Vertical Stabilizer	7.10 sq. ft.
Elevators (each 13.75 sq. ft.)	27.50 sq. ft.
Rudder	16.50 sq. ft.
Total Supporting Surface	504.88 sq. ft.
Loading (weight carried per sq. ft. of Supporting Surface)	6.42 lbs.
Loading (per B. H. P.)	15.89 lbs.

WEIGHTS:

Net Weight—Machine Empty	2225 lbs.
Gross Weight—Machine and Load	3245 lbs.
Useful Load	1020 lbs.
Fuel	625 lbs.
Oil	65 lbs.
Pilot	165 lbs.
Passenger or other Load	165 lbs.
Total	<u>1,020 lbs.</u>

SPECIFICATIONS—CONTINUED

PERFORMANCE:

Speed—Maximum—Horizontal Flight	90 miles per hour
Speed—Minimum—Horizontal Flight	48 miles per hour
Climbing Speed	4,000 feet in 10 minutes

MOTOR:

Model V2—8-Cylinder, Vee, Four-Stroke Cycle	Water cooled
Horse Power—(Rated) at 1400 R. P. M.	200
Weight per rated Horse Power.	3.45 lbs.
Bore and Stroke	5 in. x 7 in.
Fuel Consumption per Hour.	18 gals.
Fuel Tank Capacity	100 gals.
Oil Capacity Provided—Crankcase	8 gals.
Fuel Consumption per Brake Horse Power per Hour	0.54 lbs.
Oil Consumption per Brake Horse Power per Hour	0.030 lbs.

PROPELLER:

Material	Wood
Pitch—according to requirements of performance.	
Diameter—according to requirements of performance.	
Direction of Rotation (viewed from pilot's seat)	Clockwise

DETAILS:

One Pressure and Two Gravity Gasoline Tanks Located in Fuselage.
 Balanced Rudder.
 Tail Skid independent of Tail Post.
 Landing Gear Wheel, size 32 in. x 4½ in.
 Standard Equipment—Tachometer, oil gauge, gasoline gauge, complete set of tools.
 Other equipment on special order.

SPECIFICATIONS

CURTISS MODEL JN4-B—MILITARY TRACTOR

GENERAL DIMENSIONS:

Wing Span—Upper Plane	43 ft. 7 $\frac{3}{8}$ in.
Wing Span—Lower Plane	33 ft. 11 $\frac{1}{4}$ in.
Depth of Wing Chord	59 $\frac{1}{2}$ in.
Gap between Wings	62 $\frac{3}{8}$ in.
Stagger	12 $\frac{5}{8}$ in.
Length of Machine overall	27 ft. 3 in.
Height of Machine overall	9 ft. 10 $\frac{1}{2}$ in.
Angle of Incidence	2 degrees
Dihedral Angle	1 degree
Sweepback	0 degrees
Wing Curve	Eiffel No. 36
Horizontal Stabilizer—Angle of Incidence	0 degrees

AREAS:

Wings—Upper	172.15 sq. ft.
Wings—Lower	152.26 sq. ft.
Ailerons (each 17.64 sq. ft.)	35.28 sq. ft.
Horizontal Stabilizer	28.70 sq. ft.
Vertical Stabilizer	3.80 sq. ft.
Elevators (each 11.00 sq. ft.)	22.00 sq. ft.
Rudder	12.00 sq. ft.
Total Supporting Surface	359.69 sq. ft.
Loading (weight carried per sq. ft. of Supporting Surface)	5.26 lbs.
Loading (per B. H. P.)	20.55 lbs.

WEIGHTS:

Net Weight—Machine Empty	1405 lbs.
Gross Weight—Machine and Load	1890 lbs.
Useful Load—	485 lbs.
Fuel	125 lbs.
Oil	30 lbs.
Pilot	165 lbs.
Passenger or other Load	165 lbs.
Total	485 lbs.

SPECIFICATIONS—CONTINUED

PERFORMANCE:

Speed—Maximum—Horizontal Flight	75 miles per hour
Speed—Minimum—Horizontal Flight	43 miles per hour
Climbing Speed	3,000 feet in 10 minutes

MOTOR:

Model OX—8-Cylinder, Vee—Four-Stroke Cycle, Water cooled	
Horse Power—(Rated) at 1400 R. P. M.	90
Weight per rated Horse Power	4.33 lbs.
Bore and Stroke	4 in. x 5 in.
Fuel Consumption per Hour	9 gals.
Fuel Tank Capacity	20 gals.
Oil Capacity Provided—Crankcase	4 gals.
Fuel Consumption per Brake Horse Power per Hour	0.60 lbs.
Oil Consumption per Brake Horse Power per Hour	0.030 lbs.

PROPELLER:

Material	Wood
Pitch—according to requirements of performance.	
Diameter—according to requirements of performance.	
Direction of Rotation (as viewed from pilot's seat)	Clockwise

DETAILS:

- Dual Control.
- Tail Skid independent of Tail Post.
- Landing Gear Wheels, size 26 in. x 4 in.
- Standard Equipment—Tachometer, oil gauge, gasoline gauge, complete set of tools.
- Other equipment on special order.

SPECIFICATIONS

CURTISS MODEL N9—HYDROAEROPLANE

GENERAL DIMENSIONS:

Wing Span—Upper Plane	53 ft. 3 $\frac{7}{8}$ in.
Wing Span—Lower Plane	43 ft. 0 $\frac{3}{8}$ in.
Depth of Wing Chord	60 in.
Gap between Wings	60 in.
Stagger	91 $\frac{3}{8}$ in.
Length of Machine overall	29 ft. 10 in.
Height of Machine overall	10 ft. 10 $\frac{1}{2}$ in.
Angle of Incidence	4 degrees
Dihedral Angle	0 degrees
Sweepback	0 degrees
Wing Curve	R. A. F. No. 6
Horizontal Stabilizer-Angle of Incidence	0 degrees

AREAS:

Wings—Upper	242.65 sq. ft.
Wings—Lower	198.48 sq. ft.
Ailerons (each 27.5 sq. ft.)	55.00 sq. ft.
Horizontal Stabilizer	28.70 sq. ft.
Vertical Stabilizer	3.80 sq. ft.
Elevators (each 11.00 sq. ft.)	22.00 sq. ft.
Rudder	12.00 sq. ft.
Non-Skid Planes (each 3.10 sq. ft.)	6.20 sq. ft.
Total Supporting Surface	496.13 sq. ft.
Loading (weight carried per sq. ft. of Supporting Surface)	4.86 lbs.
Loading (per B. H. P.)	23.17 lbs.

WEIGHTS:

Net Weight—Machine Empty	1900 lbs.
Gross Weight—Machine and Load	2410 lbs.
Useful Load—	510 lbs.
Fuel	124 lbs.
Oil	35 lbs.
Pilot	165 lbs.
Passenger or other Load	186 lbs.
Total	510 lbs.

SPECIFICATIONS—CONTINUED

PERFORMANCE:

Speed—Maximum—Horizontal Flight	70 miles per hour
Speed—Minimum—Horizontal Flight	45 miles per hour
Climbing Speed	2,000 feet in 10 minutes

MOTOR:

Model OXX—8-Cylinder, Vee, Four-Stroke Cycle	Water cooled
Horse Power—(Rated) at 1400 R. P. M.	100
Weight per rated Horse Power.	4.01 lbs.
Bore and Stroke	4 $\frac{1}{4}$ in. x 5 in.
Fuel Consumption per Hour.	10 gals.
Fuel Tank Capacity	20 gals.
Oil Capacity Provided—Crankcase	4 gals.
Fuel Consumption per Brake Horse Power per Hour	0.60 lbs.
Oil Consumption per Brake Horse Power per Hour	0.030 lbs.

PROPELLER:

Material	Wood
Pitch—according to requirements of performance.	
Diameter—according to requirements of performance.	
Direction of Rotation (as viewed from pilot's seat)	Clockwise

DETAILS:

Dual Control.	
Pontoons—Length	15 ft. 10 in.
Pontoons—Width	4 ft. $\frac{1}{2}$ in.
Pontoons—Depth	2 ft.
Main pontoon supplied with step.	
Wings supplied with pontoons at outer ends.	
Standard Equipment—Tachometer, oil gauge, gasoline gauge, complete set of tools.	
Other equipment on special order including hoisting cable.	

SPECIFICATIONS

CURTISS MODEL F FLYING BOAT

GENERAL DIMENSIONS:

Wing Span—Upper Plane	45 ft. 2 in.
Wing Span—Lower Plane	35 ft. 0 in.
Depth of Wing Chord	62 in.
Gap between Wings	71 in.
Stagger	0 degrees
Length of Machine overall	28 ft. 0 in.
Height of Machine overall	9 ft. 8½ in.
Angle of Incidence	6½ degrees
Dihedral Angle	0 degrees
Sweepback	0 degrees
Wing Curve	Curtiss
Horizontal Stabilizer-angle of Incidence	1 degree

AREAS:

Wings—Upper	218.6 sq. ft.
Wings—Lower	158.00 sq. ft.
Ailerons (each 21.7 sq. ft.)	43.4 sq. ft.
Horizontal Stabilizer	26.8 sq. ft.
Vertical Stabilizer	24.2 sq. ft.
Elevators (each 13.75 sq. ft.)	27.50 sq. ft.
Rudder	13.5 sq. ft.
Non-Skid Planes (each 8 sq. ft.)	16 sq. ft.
Total Supporting Surface	420 sq. ft.
Loading (weight carried per sq. ft. of Supporting Surface)	5 lbs.
Loading (per B. H. P.)	22.80 lbs.

WEIGHTS:

Net Weight—Machine Empty	1440 lbs.
Gross Weight—Machine and Load	2100 lbs.
Useful Load—	660 lbs.
Fuel	200 lbs.
Oil	30 lbs.
Pilot	165 lbs.
Passenger or other Load	265 lbs.
Total	660 lbs.

SPECIFICATIONS—CONTINUED

PERFORMANCE:

Speed—Maximum—Horizontal Flight	65 miles per hour
Speed—Minimum—Horizontal Flight	45 miles per hour
Climbing Speed	1,500 feet in 10 minutes

MOTOR:

Model OX—8-Cylinder, Vee, Four-Stroke Cycle	Water cooled
Horse Power—(Rated) at 1400 R. P. M.	90
Weight per rated Horse Power.	4.17 lbs.
Bore and Stroke	4 in. x 5 in.
Fuel Consumption per Hour.	9 gals.
Fuel Tank Capacity	34 gals.
Oil Capacity Provided—Crankcase	4 gals.
Fuel Consumption per Brake Horse Power per Hour	0.60 lbs.
Oil Consumption per Brake Horse Power per Hour	0.030 lbs.

PROPELLER:

Material	Wood
Pitch—according to requirements of performance.	
Diameter—according to requirements of performance.	
Direction of Rotation (as viewed from pilot's seat)	Clockwise

DETAILS:

Dual Control—Abreast.	
Horizontal Stabilizer—Triangular.	
Balanced Rudder.	
Non-Skid Planes between outer wing struts above top-plane.	
Two Wing Pontoons.	
Hull—Nose to Rudder Post	24 ft. 7 in.
Hull—Width	4 ft. 7 in.
Hull—Height	3 ft. 7 in.
Standard Equipment—Tachometer, oil gauge, gasoline gauge, complete set of tools.	
Other equipment on special order.	

CURTISS AERONAUTICAL MOTORS

CURTISS motors occupy a unique position in the world of Aviation. They were the first successful aeronautical engines to be placed on the market. They hold practically every Aviation Record both for speed and endurance. They are the only American motors representing years of practical and successful experience in the manufacture and daily use of aeroplanes.

It was the motor that he designed and built, even before he turned his attention to aviation, that made Glenn H. Curtiss famous.

The Curtiss Aeronautical Motor is the fruit of thirteen years of painstaking effort to produce a power plant combining high efficiency, power and reliability with low weight and low fuel consumption.

No other motors, of equal power, will stand for so long a time the strain of delivering *maximum* power under varying conditions. Time and again Curtiss motors have established new world's records for speed and endurance. With them Mr. Curtiss won such important trophies as—

The Gordon-Bennett International Trophy,

The Scientific-American Trophy

(won successively in 1908, 1909 and 1910),

The Collier Aviation Trophy,

and made all his well known pioneer flights, such as his trip down the Hudson River from Albany to New York City, and others of equal note. With them he was enabled to perfect his great inventions—the flying boat and hydroaeroplane.

With various improvements, which years of ripening experience have brought, Curtiss motors are now recognized throughout the world as thoroughly reliable and efficient aeronautical power plants. They have frequently been run continuously for a hundred hours, without being torn down or adjusted, and aviators who have seen them in action marvel at their steadiness and lasting qualities.

Early in the progress of aviation both the Army and Navy selected Curtiss motors and Curtiss aeroplanes and hydroaeroplanes as especially well suited for military service. Many foreign governments have since placed orders for great quantities and are using them in large numbers for training and service work. There is no more severe work to which an aeroplane or motor can be subjected.

Almost without exception the big things done in American Aviation, since the production of the Curtiss motor, may be attributed to its power, speed and reliability. Without it the big Flying Boats would have been impossible. Without it the Curtiss product would never have attained the widespread reputation that it enjoys to-day.

It drove J. B. R. Verplanck and Beckwith Havens to victory, in the Aero-Hydro 1,000 mile cruise from Chicago to Detroit. It carried the same machine safely through to Buffalo and later, down the Hudson River, from Albany to New York City.

It has carried Victor Carlstrom successfully through his many famous record flights; including those from Newport News, Va., to Washington, D. C., and from Chicago to New York.

In the early days when Frank Burnside attacked the Lincoln Beachey altitude record, attaining nearly 12,000 feet, the Curtiss "OX" motor helped him on.

William S. Lucky, winner of the "Aerial Derby" around Manhattan Island and Chas. Niles, second man to finish that then strenuous race, both used Curtiss motors.

In their flight, from Newport News, Va., to New York City, Steve MacGordon and William Thaw relied upon Curtiss motors.

Glenn L. Martin's record breaking flights in his Tractor-Aero-Yacht was made with this same reliable Curtiss power plant.

Harold F. McCormick's successful season of aero-commuting, between his summer home in Lake Forrest and his offices in Chicago, was made possible by Curtiss motor.

With it Ruth Law made her record breaking flight from Chicago to New York City.

Curtiss motors and aeroplanes have helped to make the reputations of such famous flyers as Victor Carlstrom, Lincoln Beachey, C. K. Hamilton, Lawrence Sperry, Lieut. T. G. Ellyson, Lieut. J. H. Tower, Charles C. Witmer, Beckwith Havens, Francis Wildman, John Lansing Callan, W. E. Doherty, David H. McCulloch, Hugh Robinson, Philip Rader, William Thaw, John McCurdy, Capt. Augustin Parla, Stephenson MacGordon, as well as a hundred or more famous exhibition flyers and amateur sportsmen.

CURTISS DEVELOPMENT

IN the nine years since the first aeroplane of the Aerial Experiment Association made a successful flight at Hammondsport, N. Y., the improvement in the Curtiss product has been so rapid that the step from the experimental machine to the highly perfected, practical Curtiss aeroplanes and hydroaeroplanes of to-day has been made in less time than similar progress has ever been recorded in the development of any other important means of transportation.

In 1908 Mr. Curtiss won the first aeroplane contest in this country, by flying what was then considered a remarkable distance of a mile and one-half straightaway. A year later he outclassed the dozen or more of the world's aeroplane makers who had by that time entered the field, by winning the first Gordon Bennett International Aeroplane Race, which was held at Rheims, France.

Always continuing to experiment, Mr. Curtiss, in 1910, in an aeroplane equipped with pontoons, the first step in the development of the Curtiss hydroaeroplane, made the first great cross-country aeroplane flight, from Albany to New York, a distance of 150 miles, in the actual flying time of 152 minutes.

Having demonstrated by his own achievements the practical value of the Curtiss aeroplane as a machine embodying durability, speed, safety, and an instinctive control, Mr. Curtiss turned his attention to the further development of the Curtiss aeroplane along two distinct lines—for military purposes and for pleasure.

At his experimental station at San Diego, California, during the winter of 1910 and 1911, Mr. Curtiss developed further improvements in the construction and design of his machines. It was, also, at San Diego that the first flight from land to water, and vice versa, was made, the new Curtiss hydroaeroplane being used for the purpose.

These various developments, resulting from the San Diego experiments, were witnessed by officers especially detailed from the United States Army and Navy. The military authorities at Washington, recognizing the exceptional advantages of the Curtiss aeroplane and the Curtiss hydroaeroplane for Army and Navy uses, immediately proceeded to equip the two branches of the service with these machines.

It is this finished product, developed and manufactured under the personal direction of Mr. Curtiss, who has preferred to profit by his own experience in actual flight rather than depend on the experience of others, that is now offered to those seeking a new and exciting sport and to those who recognize the commercial and practical values of the aeroplane.

EARLY CURTISS RECORDS

The first aeroplane:

To make a previously announced flight in public, July 4, 1908, by Glenn H. Curtiss at Hammondsport, N. Y.

To win a prize in open competition in America, *Scientific American* trophy, July 4, 1908, by Glenn H. Curtiss at Hammondsport, N. Y.

To win the Gordon Bennett International trophy, August, 1909, by Glenn H. Curtiss at Rheims, France.

To make a city-to-city flight, May 29, 1910, Glenn H. Curtiss, Albany to New York.

To use a river as an aerial highway, May 29, 1910, Glenn H. Curtiss, Albany to New York down the Hudson.

To carry a message from one official to another, May 29, 1910, by Glenn H. Curtiss, Governor Hughes, Albany, to Mayor Gaynor, New York.

To successfully alight on the water, June, 1910, Glenn H. Curtiss on Lake Keuka, Hammondsport, N. Y.

To demonstrate bomb dropping possibilities, June, 1910, Glenn H. Curtiss, at Hammondsport, N. Y., auspices *New York World*.

To make an over-the-ocean flight, fifty miles, July, 1910, Glenn H. Curtiss, Atlantic City, N. J.

To demonstrate aerial sharpshooting with an army officer, Lieutenant T. E. Fickel, U. S. A., marksman, August, 1910, Sheepshead Bay, New York.

To send and receive wireless messages from an aeroplane in flight, August, 1910, by J. A. D. McCurdy, at Sheepshead Bay, New York, and in February, 1911, McCurdy at Palm Beach, Fla.

To alight on and fly from the deck of a battleship, January 18, 1911, Eugene Ely at San Francisco.

To fly from the water, January 26, 1911, Glenn H. Curtiss, on San Diego Bay, San Diego, Cal.

To alight alongside and be hoisted aboard a warship, Glenn H. Curtiss, February 17, 1911, at San Diego, Cal.

To fly from land to water and from water to land, Glenn H. Curtiss, February 23, 1911, San Diego, Cal.

To arise from the water with passenger, Glenn H. Curtiss with Lieutenant Theodore G. Ellyson, U. S. Navy, passenger, at San Diego, Cal., February 27, 1911.

To be adopted by the United States Navy as practical air and water craft, April, 1911.

To be equipped with dual control, allowing two aviators to operate the control while in flight.

To be used by Navy officers in over-water flight, Lieutenant T. G. Ellyson and Lieutenant J. H. Towers, Annapolis, Md., to Buckroe Beach, Va., 143 miles, October 25, 1911.

To be used in carrying U. S. mail in long over-water flight, Hugh Robinson down the Mississippi River, Minneapolis, Minn., to Rock Island, Ill., 375 miles.

To ascend to the height of 11,642 feet (world's record), Lincoln Beachey, at Chicago, August 20, 1911.

To win inter-city race in the United States, Lincoln Beachey, New York to Philadelphia, August 5, 1911.

To fly over Niagara Falls and through the Gorge, Lincoln Beachey, June 28, 1911.